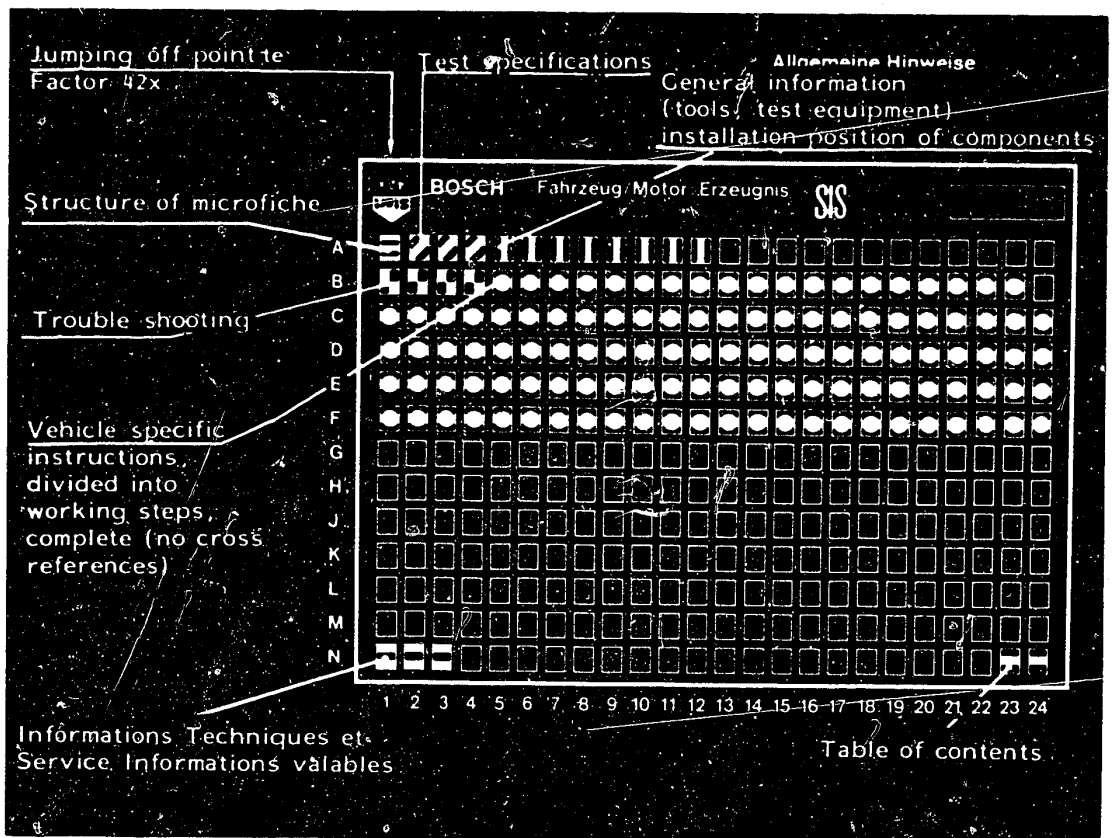


# Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

<b>E 16</b>	Product/assembly/test step	
	Vehicle/engine	

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar. |

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

**C 6**

**A1**

Trouble-Shooting Plan



## 1. Test specifications

1.1 Idle speed:  $880 \pm 30 \text{ min}^{-1}$

**C8**

1.2 Nozzle-opening pressure:  $143 \pm 7 \text{ bar}$

**C11**

1.3 Filter test  
max. allowable  
differential  
pressure:  $0.3 \text{ bar}$

**C15**

1.4 Compression pressure:  
at cranking speed  
and with engine  
warm

max. 32 bar

min. 20 bar

**D11**

max. difference  
between cylinders  $6 \text{ bar}$

1.5 Compression loss: max. 25%

1.6 Injection timing:  
Setting value

Engine position: TDC on cylinder 1

**F17**

Setting value  
Pump position:

$0.92 \text{ mm ABDC}$

Checking value  
Pump position

$0.91 \dots 0.93 \text{ mm ABDC}$

**A2**

Test specifications

Ford Escort D, Fiesta D, Orion D



## 1.7 Cold-starting device

Engine speed	Ambient temperature	On-time	Thermocouple ( $R_i$ )
above 2000 min <sup>-1</sup>	above + 35°C + 20°C - 20°C	out of operation approx. 30 sec approx. 165 sec	23 $\Omega$

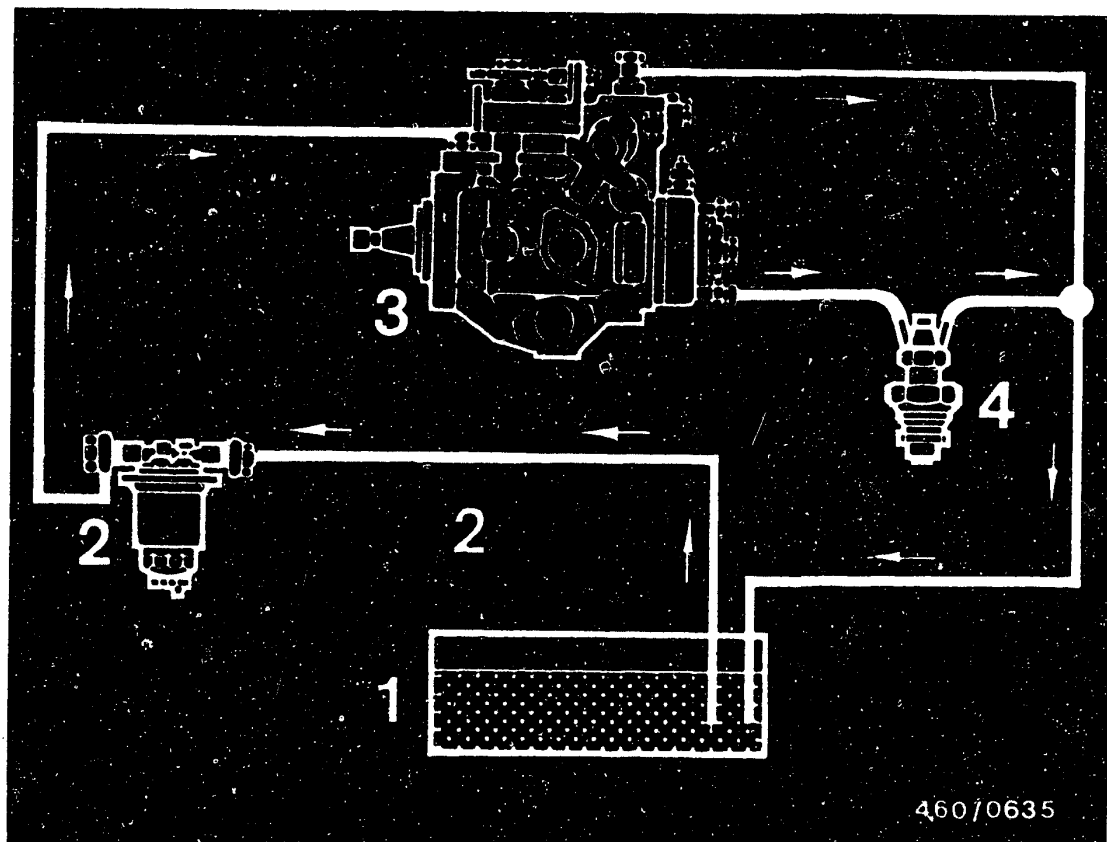


### 1.8 Tightening torques

Injection-pump drive gear	18 - 22 Nm
Injection-pump fastening nuts	18 - 22 Nm
Injection-pump support bracket	18 - 22 Nm
Bleeder screw	20 - 26 Nm
Camshaft gear	27 - 33 Nm
Screw plug for setting mandrel	20 - 25 Nm
Nozzle-holder assembly fastening screws	60 - 80 Nm
Sheathed-element glow plugs	25 - 30 Nm
Tensioning-roller holder fastening screw	27 - 33 Nm
Injection line union nut	15 - 25 Nm
Nozzle-retaining nut	70 - 90 Nm
Overflow restriction	20 - 30 Nm
Fuel inlet tube fitting	20 - 30 Nm







1 = Fuel tank  
2 = Fuel filter

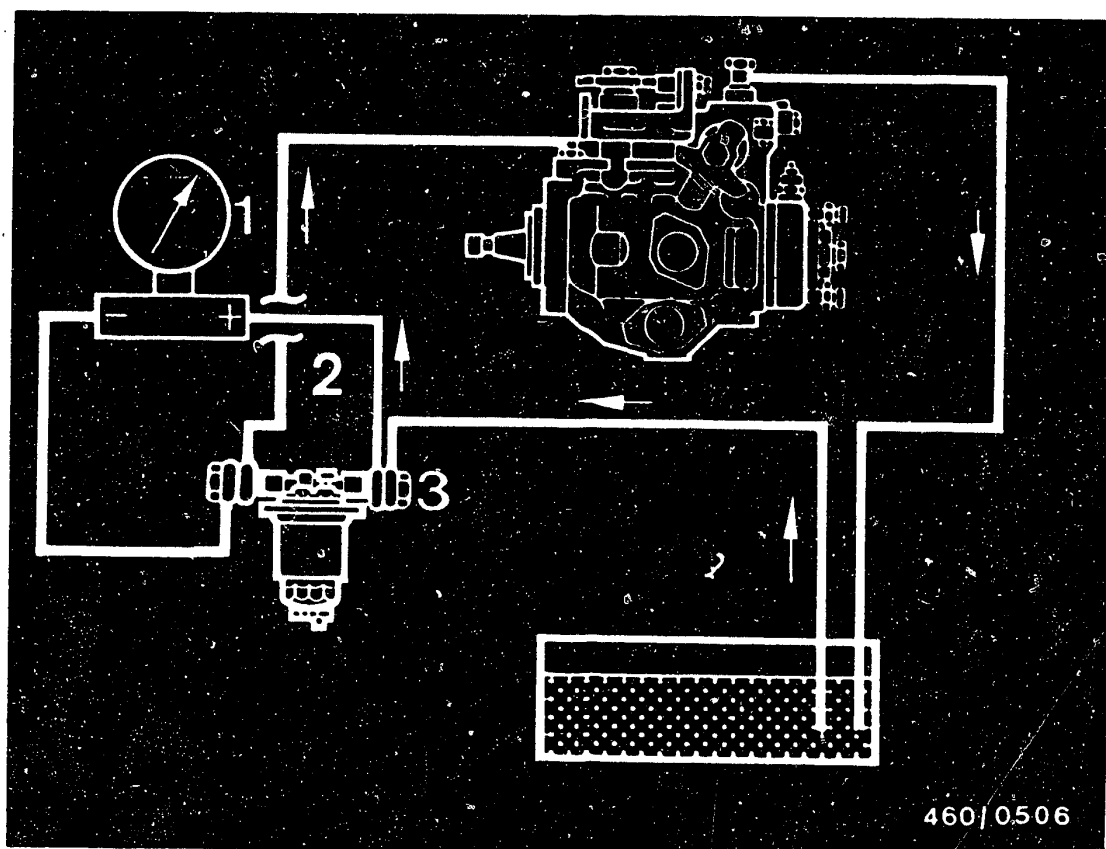
3 = Distributor-type injection pump  
4 = Injection nozzles

## 2. Diagram of fuel lines

The fuel lines are connected according to the above diagram.

The fuel flows in the direction of the arrows.



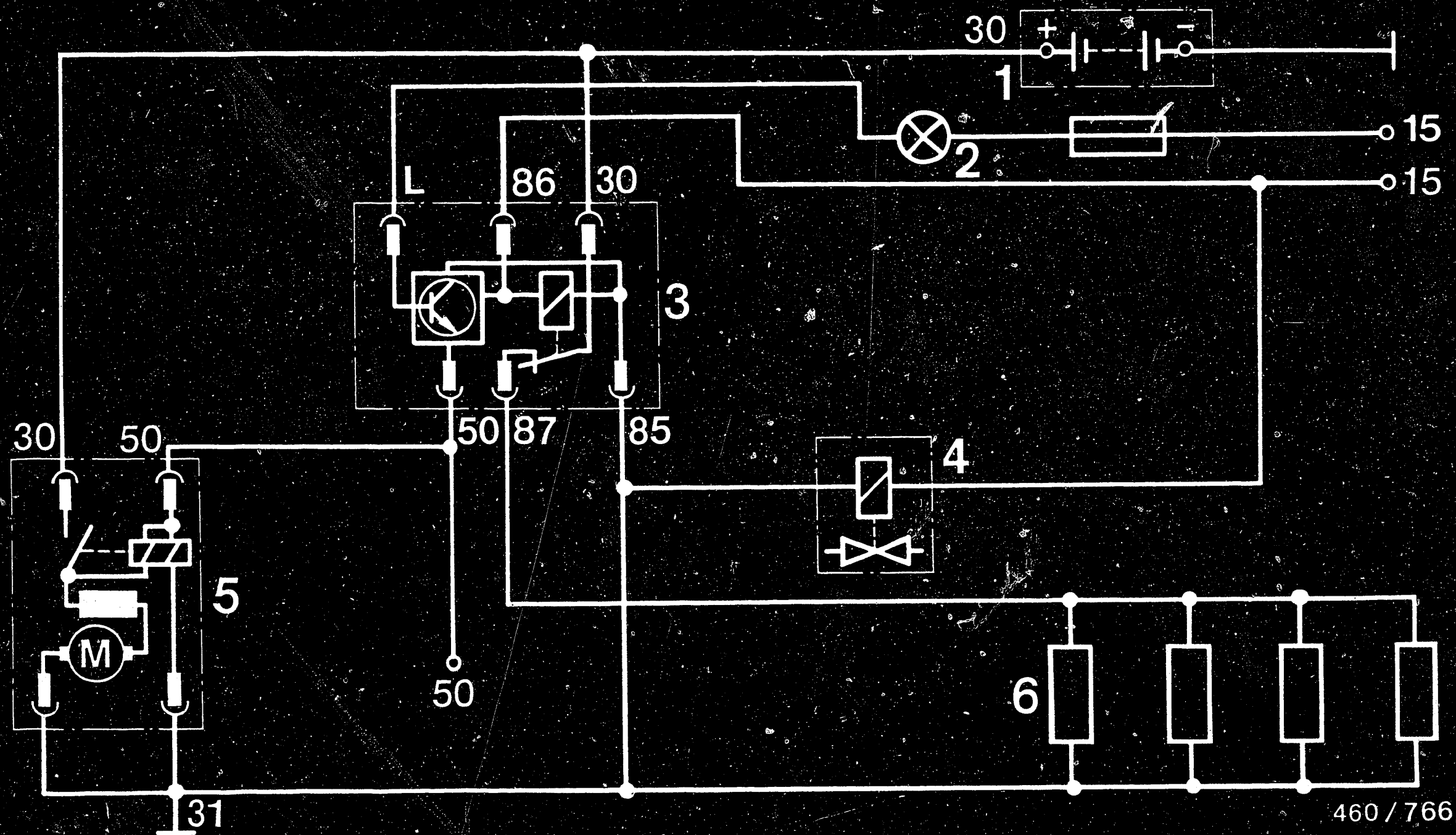


- 1 = Differential-pressure gauge
- 2 = Filter outlet (use inlet union and extra-long inlet-union screw 2 443 456 020)
- 3 = Filter inlet (use inlet union and extra-long inlet-union screw 2 443 456 020)

#### 2.1 Connection diagram for filter test

Connect differential-pressure gauge to fuel filter using appropriate connecting pieces.





1 = Battery  
2 = Glow plug indicator lamp

3 = Glow-duration unit  
4 = Solenoid-operated valve

5 = Starting motor  
6 = Glow plugs

3. Terminal diagram for preheating system

**A7**

Test preheating system  
Ford Escort D, Fiesta D, Orion D



**A8**

Test preheating system  
Ford Escort D, Fiesta D, Orion D



460 / 766

#### 4. Test equipment and tools

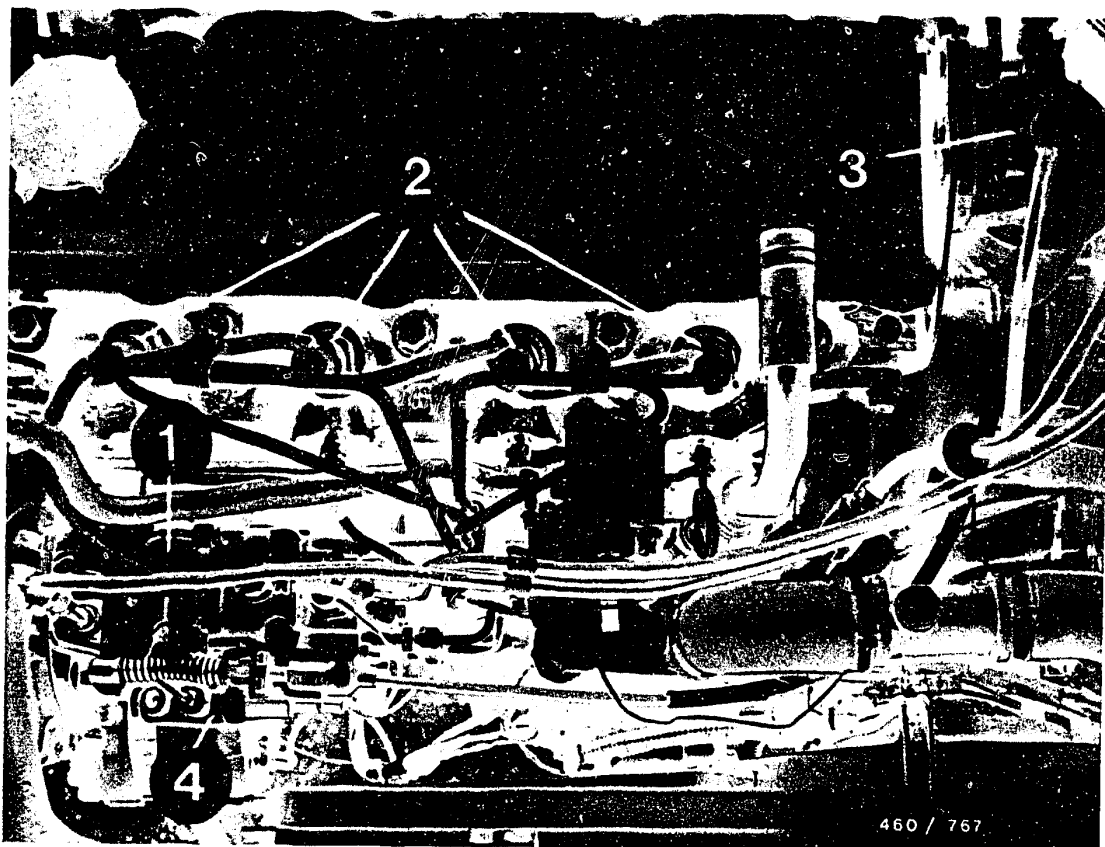
Designation	Part number	Use
Setting rule	KDEP 1117	Locking the cam-shaft
Setting mandrel	KDEP 1149	Locking the crankshaft
Screwdriver sockets for torque wrench 1/2inch square	Hazet 995 - T 50 Wera-Kraft 767C-TX 50	Tensioning the toothed belt
Box wrench	KDEP 1115	Loosening/ tightening the injection lines
Measuring tool	KDEP 1085	Injection timing
Mini dial indicator 1/100 mm divisions	Commercially available e.g. Hahn & Kolb 7000 Stuttgart Part No. 33 003 with adapter KDEP 1127	Injection timing
Puller	KDEP 1148	Removing the injection pump
Toothed belt tester	KDEP 1121	Testing the tension of toothed belt



## Test equipment and tools (continued)

Designation	Part number	Use
Nozzle tester	EFEP 60 H 0 681 200 502	Testing the injection nozzles
Compression tester	Commercially available	Testing the engine compression
Compression-loss tester	EFAW 210 A 0 681 001 901	Testing the engine compression loss
Tachometer	Commercially available e.g. Dr. E. Horn GmbH Meßgerätefabrik Postfach 40 7036 Schönaich Order designation: HT 446 (with digital display)	Setting the engine speed
Differential-pressure gauge	Commercially available Part No. NG 160/311-911 -1.0 + 4.0 bar Firma Henni Nauheimer Str. 78-80 7000 Stuttgart 50	Filter test
Smokemeter Accessories box with metering pump	0 684 102 050 0 681 169 038	Smoke test

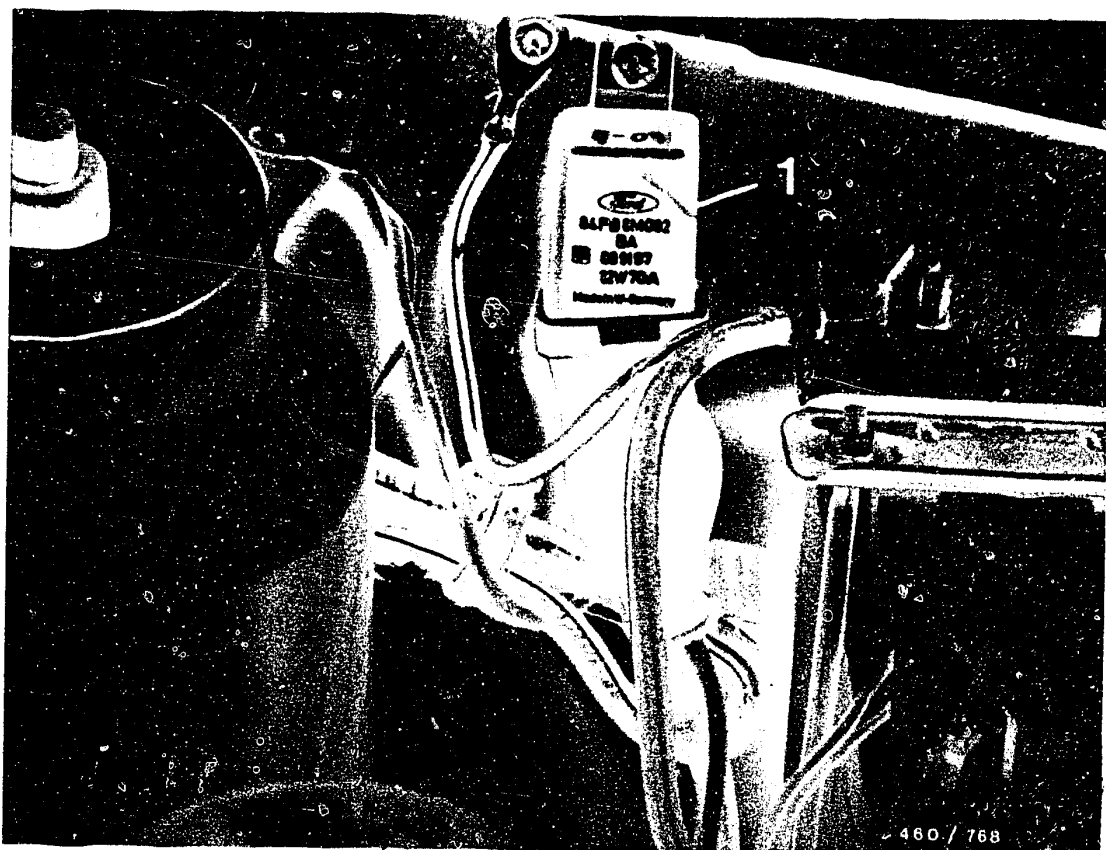




### 5. Installation position of components

- 1 = Fuel-injection pump
- 2 = Injection nozzles
- 3 = Fuel filter
- 4 = Hydraulic cold-start accelerator (KSB)





1 = Glow-duration unit, mounted on left-hand firewall near battery.

**A12**

Installation position of components  
Ford Escort D, Fiesta D, Orion D



# 6. Trouble-shooting - Customer complaint (symptom)

1. Engine fails to start or starts only with great difficulty when warm.
2. Engine fails to start or starts only with great difficulty when cold
3. Engine hunts when idling.
4. Erratic idling when engine is warm.
5. Engine misses during vehicle operation.
6. Unsatisfactory performance.

						Cause (component (fault))	Coordinate
●	●			●	●	Tank empty; tank vent clogged	B 5
	●					Cold-start accelerator not actuated	B 6
	●		●			Injection sequence does not correspond to firing sequence	B 7
				●		Overflow restriction clogged	B 8
●	●					Shutoff device defective	B 9
		●		●	●	Inlet-union screws of inlet and return lines clogged	B 12
●	●		●	●	●	Air in fuel system	B 14
		●				Heavy paraffin deposits in filter	B 17
●	●			●	●	Connections loose; lines leaky or broken	B 20
●	●			●	●	Supply lines clogged	B 23
●	●			●	●	Fuel-injection tubing clogged or constricted	B 23
					●	Engine air filter clogged	B 24
			●			Idle speed incorrect	C 8
●	●		●		●	Injection nozzle defective	C 11
	●		●		●	Start of pump delivery incorrect	F 17
●	●			●	●	Fuel filter clogged	C 15
	●					Pre-heating system defective	C 18
					●	Timing device defective	D 10
	●		●			Engine compression poor or uneven	D 11
					●	Maximum speed incorrectly adjusted	D 21
●	●	●	●	●	●	Fuel-injection pump (governor) defective or out of adjustment	D 21

**B1**

Trouble-shooting chart

Ford Escort D, Fiesta D, Orion D



**B2**

Trouble-shooting chart

Ford Escort D, Fiesta D, Orion D





# Trouble-shooting (continued)

7. Fuel consumption too high.

8. Engine cannot be switched off.

9. Engine runs rough, black smoke in full-load range; possibly lack of power.

10 Fog-like smoke in full-load range (white).

11. Incorrect engine speeds.

12. Engine will not rev up when cold.

13. Distributor-type fuel-injection pump overheats.

<u>Cause</u> (component fault)							<u>Coordinates</u>
			●		●		Tank empty; tank vent clogged B 5
					●		Cold-start accelerator not actuated B 6
		●		●	●		Injection sequence does not correspond to firing sequence B 7
						●	Overflow restriction clogged B 8
	●						Shutoff device defective B 9
			●	●	●		Inlet-union screws of inlet and return lines clogged B 12
			●		●		Air in fuel system B 14
					●		Heavy paraffin deposits in filter B 17
●							Connections loose; lines leaking or broken B 20
			●		●		Supply lines clogged B 23
			●		●		Injection lines clogged or constricted B 23
		●					Engine air filter clogged B 24
				●			Idle speed incorrect C 8
		●					Injection nozzle defective C 11
●		●	●		●		Start of delivery incorrect F 17
			●		●		Fuel filter clogged C 15
							Preheating system defective C 18
		●	●				Timing device defective D 10
●					●		Engine compression poor or unequal D 11
				●			Maximum engine speed incorrectly set D 21
●	●	●	●	●	●	●	Injection pump (governor) defective or out of adjustment D 21

**B3**

Trouble-shooting chart

Ford Escort D, Fiesta D, Orion D



**B4**

Trouble-shooting chart

Ford Escort D, Fiesta D, Orion D



## 7. Check tank vent

Open tank filler cap.

If the fault disappears after opening the filler cap, the tank vent is defective.

Remove tank-vent hose lines (picture) and check for clogging or constriction.

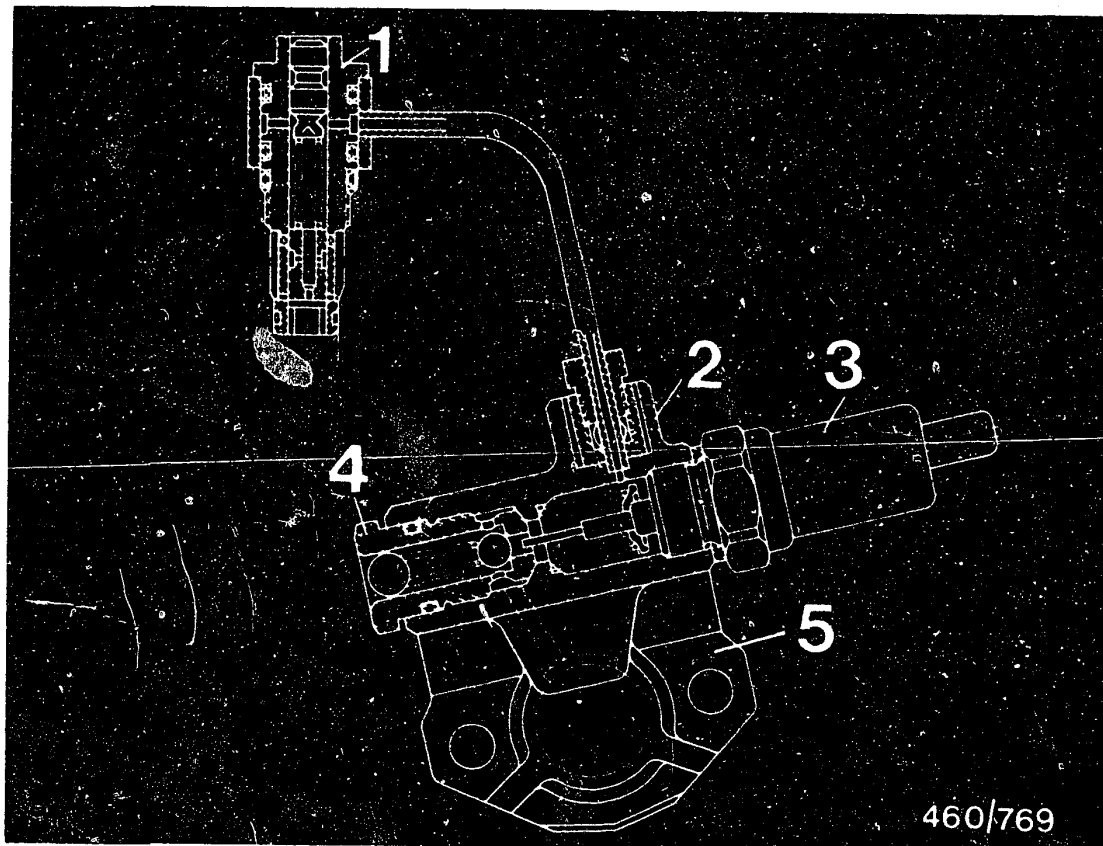
If necessary, check fitting on tank.

**B5**

Check tank vent

Ford Escort D, Fiesta D, Orion D





460/769

- 1 = Pressure regulator
- 2 = Pressure-holding valve
- 3 = Expansion element
- 4 = Ball valve
- 5 = KSB valve

#### 8. Checking the operation of the hydraulic cold-start accelerator (KSB)

If the engine is still noisy (knocking) when idling some minutes after cold-starting, the KSB may be defective or there may be no voltage across the expansion element (3).

There must be approx. battery voltage across the expansion element (3).

Otherwise there is an open circuit.

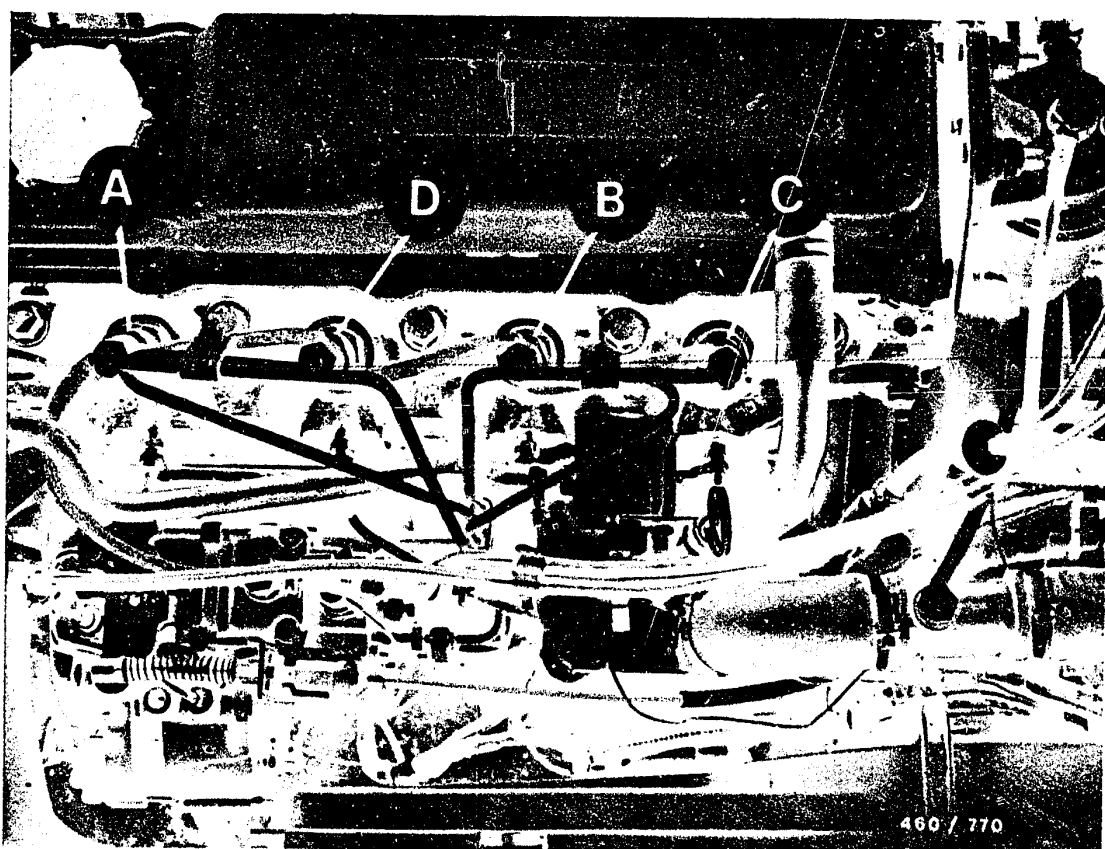
If approx. battery voltage present, replace expansion element (3).

**B6**

Test cold-start accelerator

Ford Escort D, Fiesta D, Orion D





### 9. Check routing of fuel-injection tubing

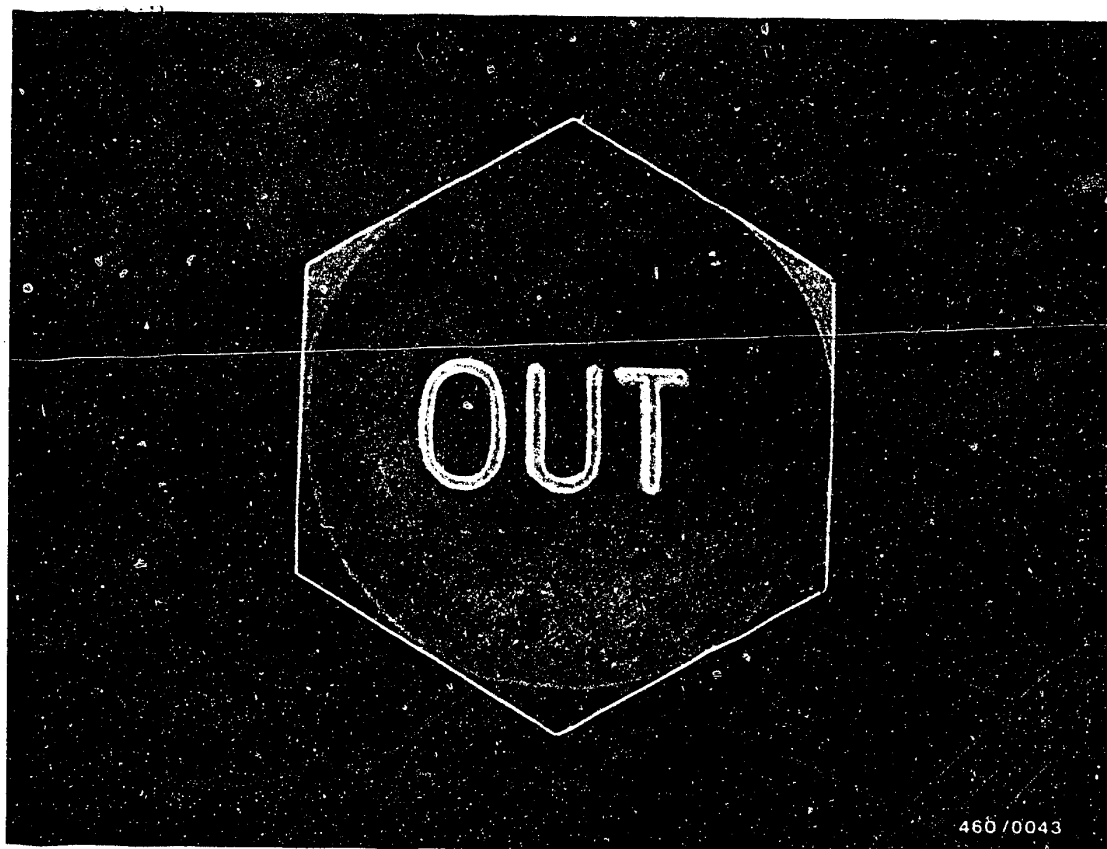
The individual fuel-injection lines are held together by clamps so that it is impossible for the outlets to be mixed up. If, however, there is any doubt, check the routing of the lines as shown in the picture above. The pairing of the fuel-injection pump outlets with the individual engine cylinders is identified by the letters A - D.

**B7**

Check fuel-injection tubing

Ford Escort D, Fiesta D, Orion D





#### 10. Check overflow restriction

Unscrew overflow restriction on fuel-injection pump (marked "out").

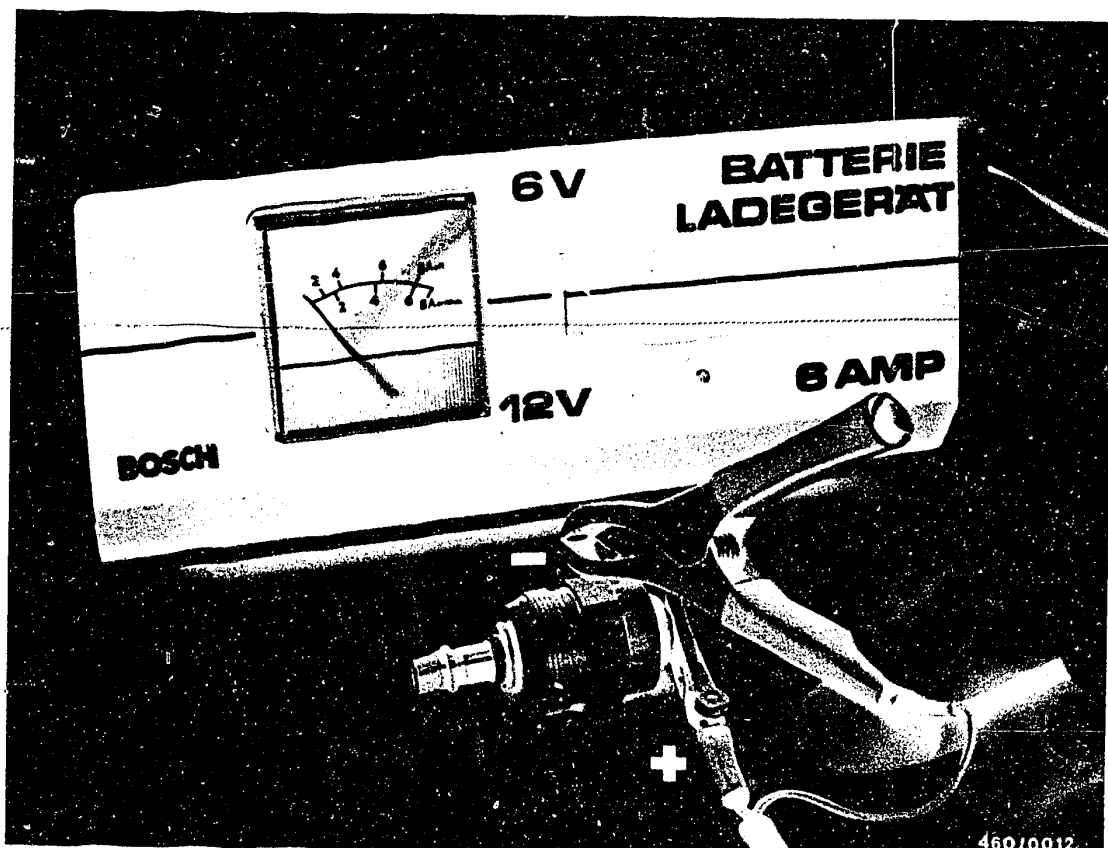
Perform visual inspection of wire screen for impurities. If in doubt, replace overflow restriction.

**B8**

Check overflow restriction

Ford Escort D, Fiesta D, Orion D





## 11. Check operation of shutoff device

### 11.1 Engine fails to start

Check whether solenoid-operated valve is supplied with voltage (min. 10 V) with glow-plug and starter switch switched on (drive position).

If voltage is present, remove fuel-injection tubing and take out solenoid-operated valve.

Cleanliness is essential.

When removed, check operation of solenoid-operated valve.

#### Note:

When removed, the solenoid-operated valve must only be supplied with voltage for a short period of time since it is no longer being cooled by the fuel.



## 11.2 Engine cannot be switched off

With the glow-plug and starter switch in the stop position there must be no voltage across the solenoid-operated valve, i.e. the fuel inlet to the distributor-pump plunger is interrupted.

If the engine continues to run although there is no voltage across the solenoid-operated valve, the engine can be stopped as follows:

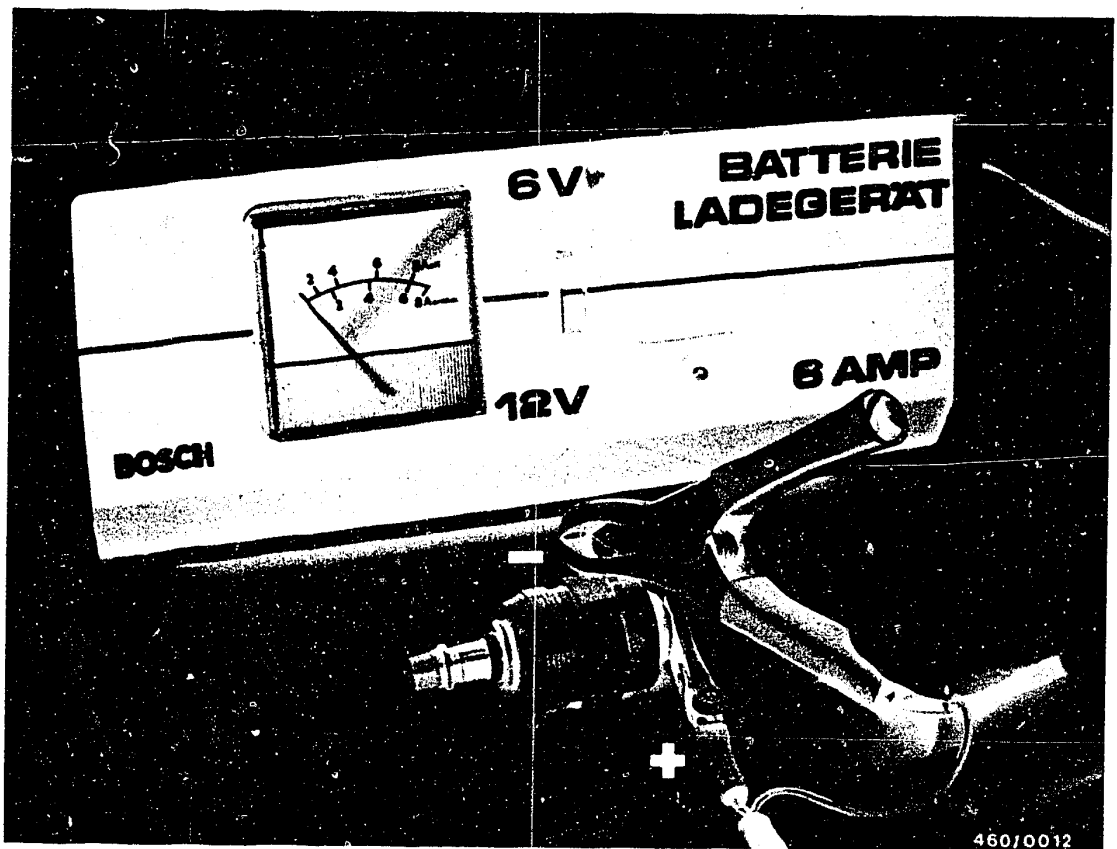
Select 3rd or 4th gear. Jam on foot brake and slowly let out clutch pedal.

**B10**

Check shutoff device

Ford Escort D, Fiesta D, Orion D





### 11.2.1 Solenoid-operated valve test

Remove fuel-injection tubing.  
Take out solenoid-operated valve.  
Cleanliness is essential.

When removed, check operation of solenoid-operated valve.

#### Note:

When removed, the solenoid-operated valve must only be supplied with voltage for a short period of time since it is no longer being cooled by the fuel.  
Check valve seat in hydraulic head (visual inspection).

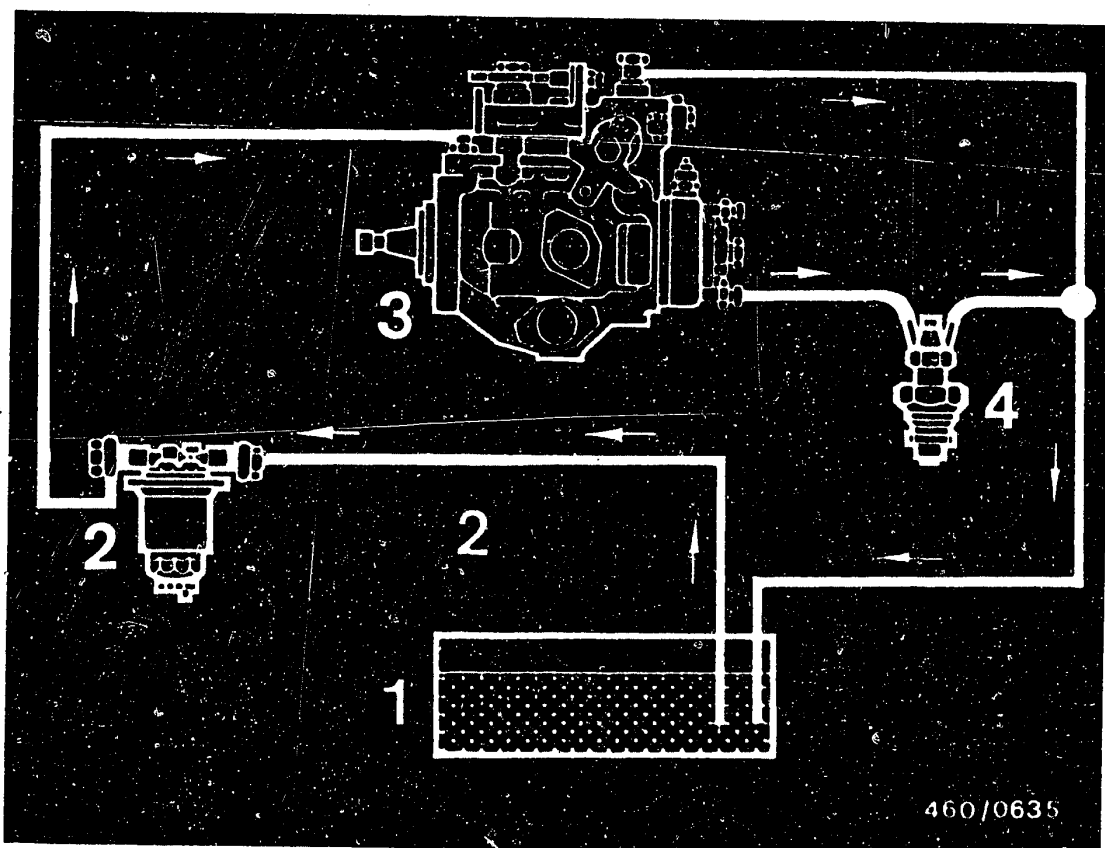
**B11**

Check shutoff device

Ford Escort D, Fiesta D, Orion D







460/0635

1 = Fuel tank  
2 = Fuel filter

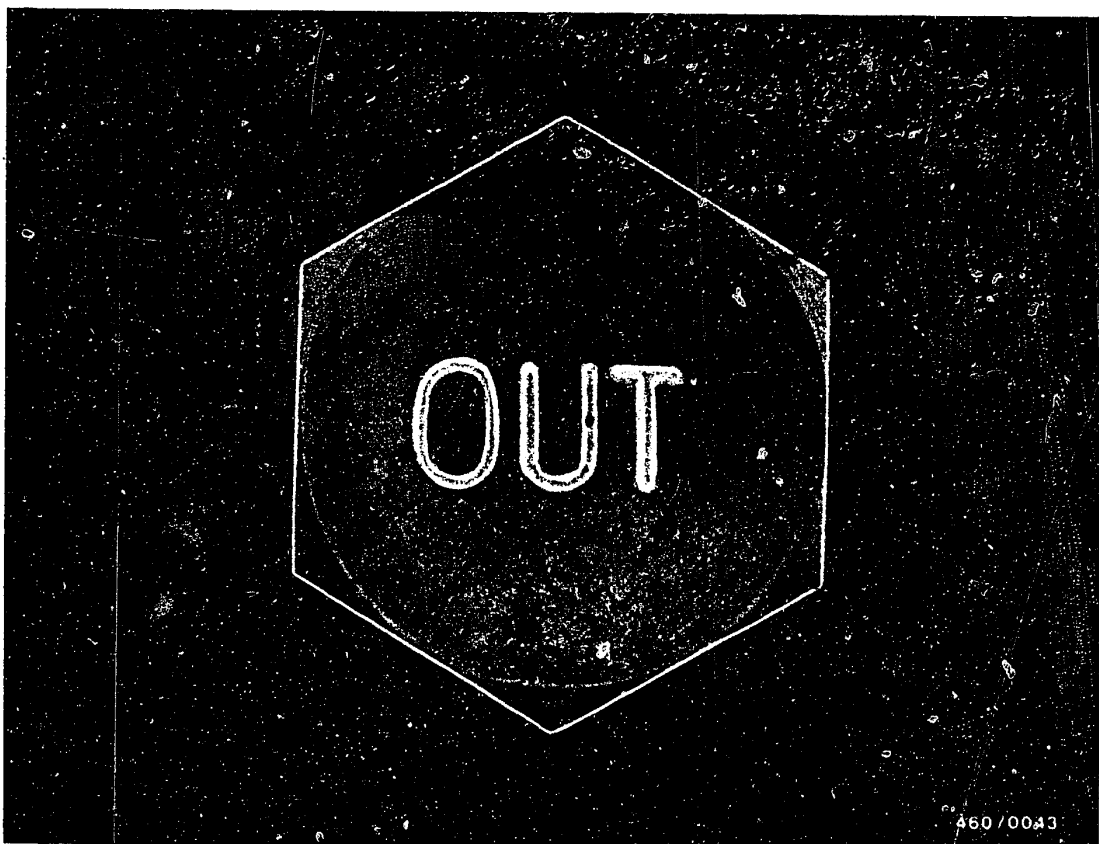
3 = Distributor-type injection  
pump  
4 = Injection nozzles

## 12. Diagram of fuel lines

The fuel lines are connected as shown in the above diagram.

The fuel flows in the direction of the arrows.



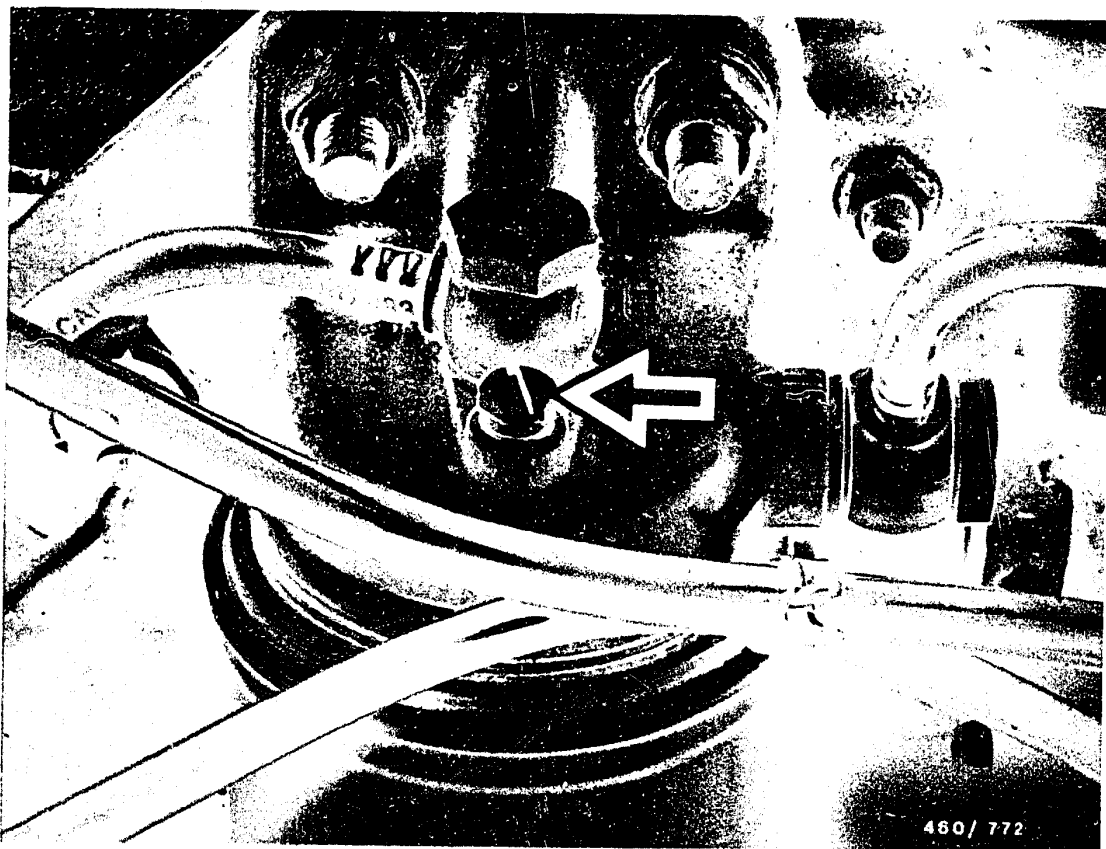


The throttle screw is on the cover of the injection pump and the head of the screw is marked with the word "out".

**B 13**

Connection diagram of fuel lines  
Ford Escort D, Fiesta D, Orion D





### 13. Bleed fuel system

Fill fuel filter and injection pump with diesel fuel.

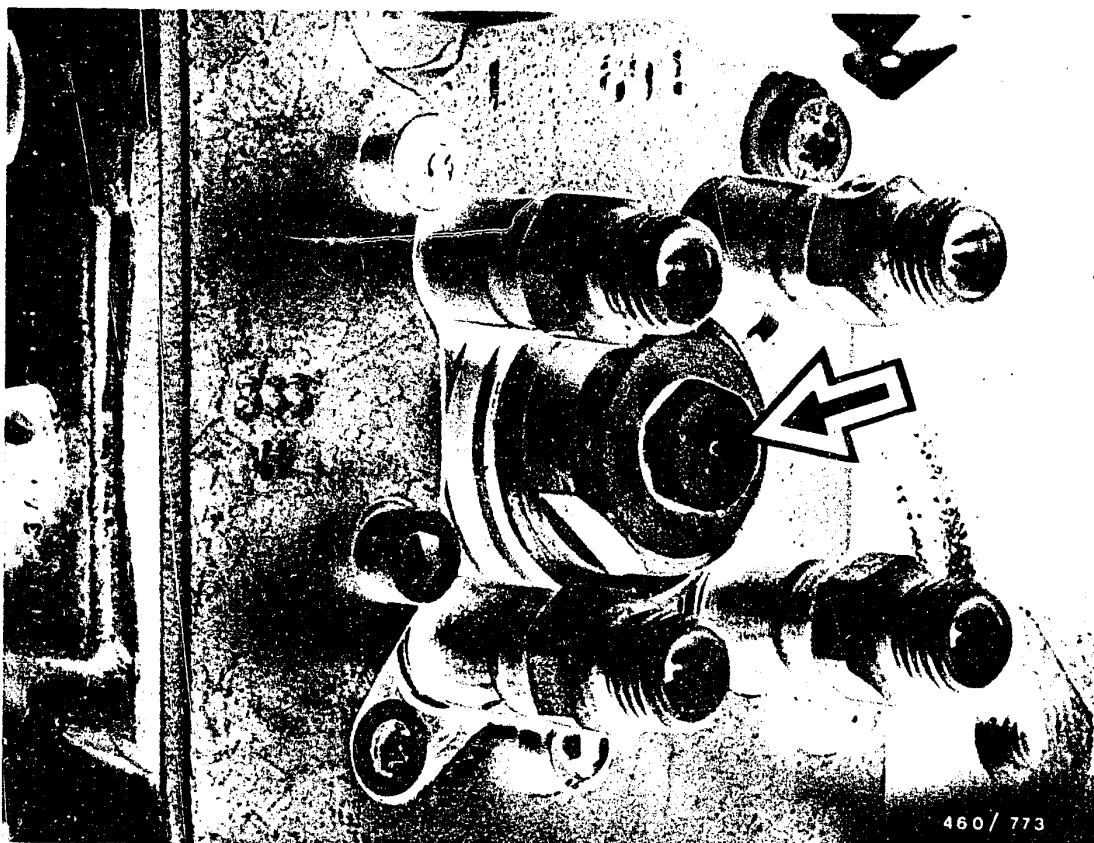
Tighten bleeder screw on fuel filter (arrow).

**B14**

Bleed fuel system

Ford Escort D, Fiesta D, Orion D





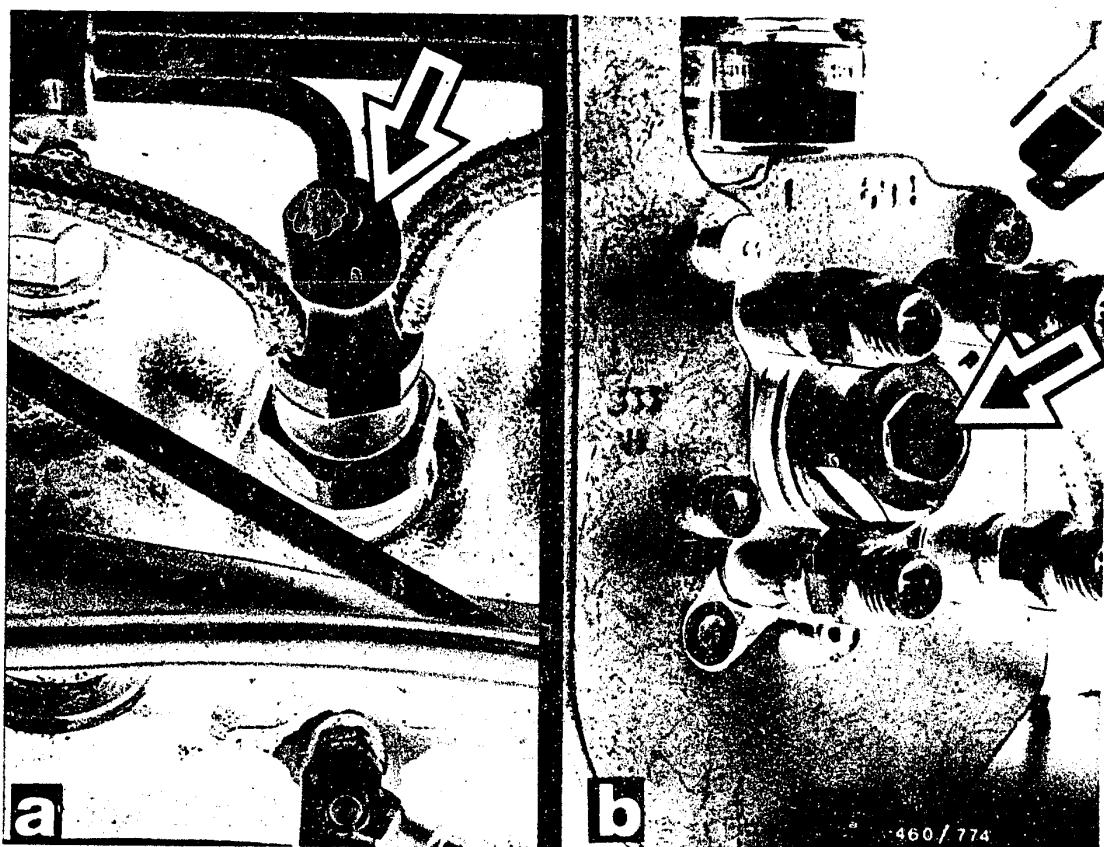
Loosen bleeder screw on injection pump and unscrew by a few turns (arrow).

**B15**

Bleed fuel system

Ford Escort D, Fiesta D, Orion D



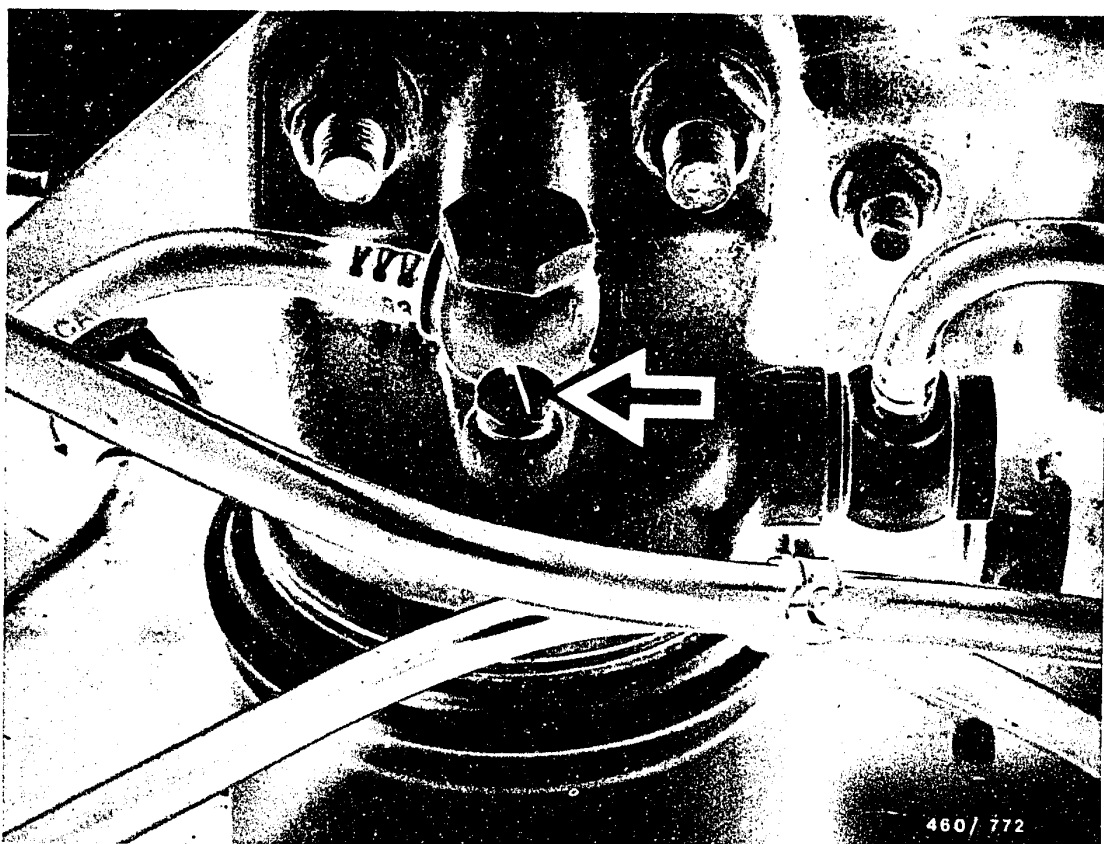


Loosen union nuts of fuel-injection tubing (Fig. a - arrow) on nozzle-holder assemblies.

Operate starting motor without preheating. When fuel escaping from bleed hole (Fig. b - arrow) of injection pump is free of bubbles, tighten bleeder screw. Continue to operate starting motor until fuel escapes from union nuts of nozzle-holder assemblies. Tighten union nuts to 15 - 25 Nm.

Operate starting motor until engine starts.





#### 14. Replace and drain water from filter box

##### 14.1 Replace filter box

Unscrew filter box and drain.

If stuck, loosen filter box with special wrench, e.g. Matra W 167.

(Arrow = Bleeder screw)

**B17**

Replace and drain fuel filter  
Ford Escort D, Fiesta D, Orion D





Rub diesel fuel into the rubber seal (arrow) of the new filter box.

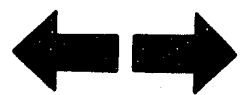
Screw the filter box into the cover by hand and tighten.

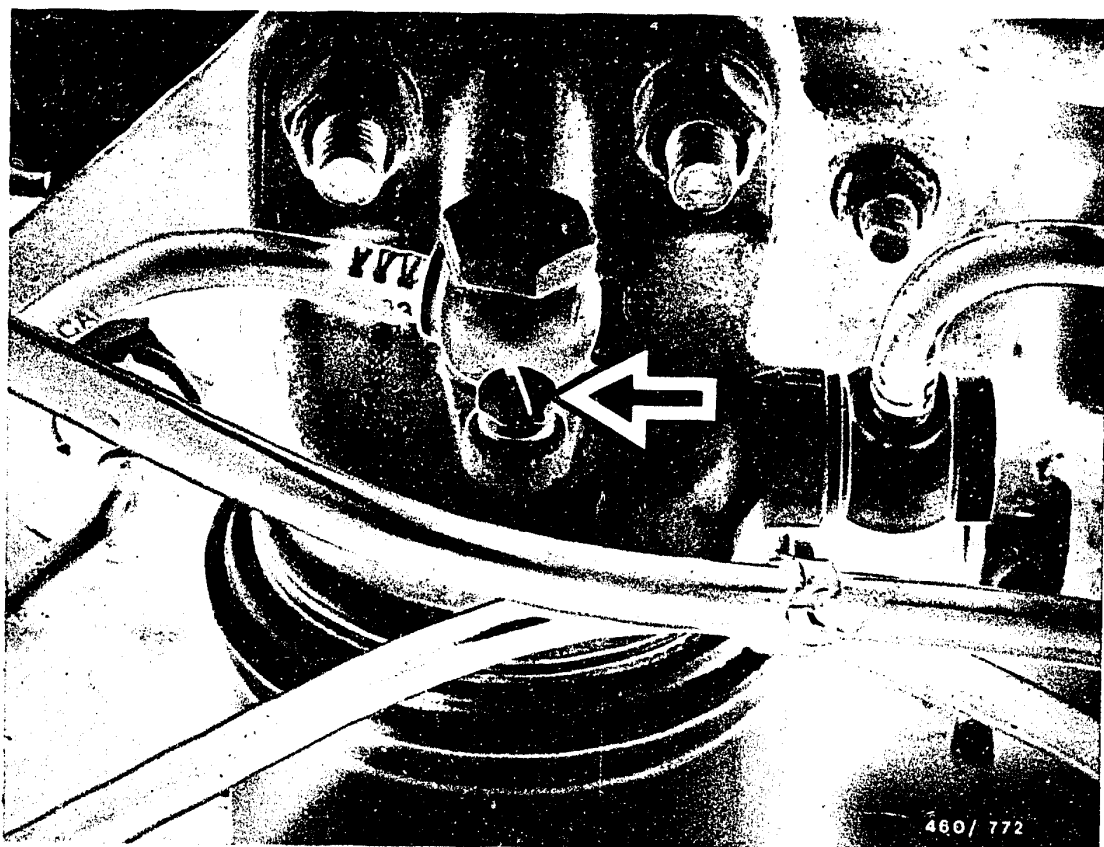
Check the fuel filter for leaks.

In the case of winter fuel it may be necessary to add petroleum as specified by the vehicle manufacturer.

**B18**

Replace and drain water from fuel filter  
Ford Escort D, Fiesta D, Orion D





#### 14.2 Drain water from fuel filter

Loosen bleeder screw on filter cover (arrow) by a few turns.

Loosen water-drain plug on base of filter.

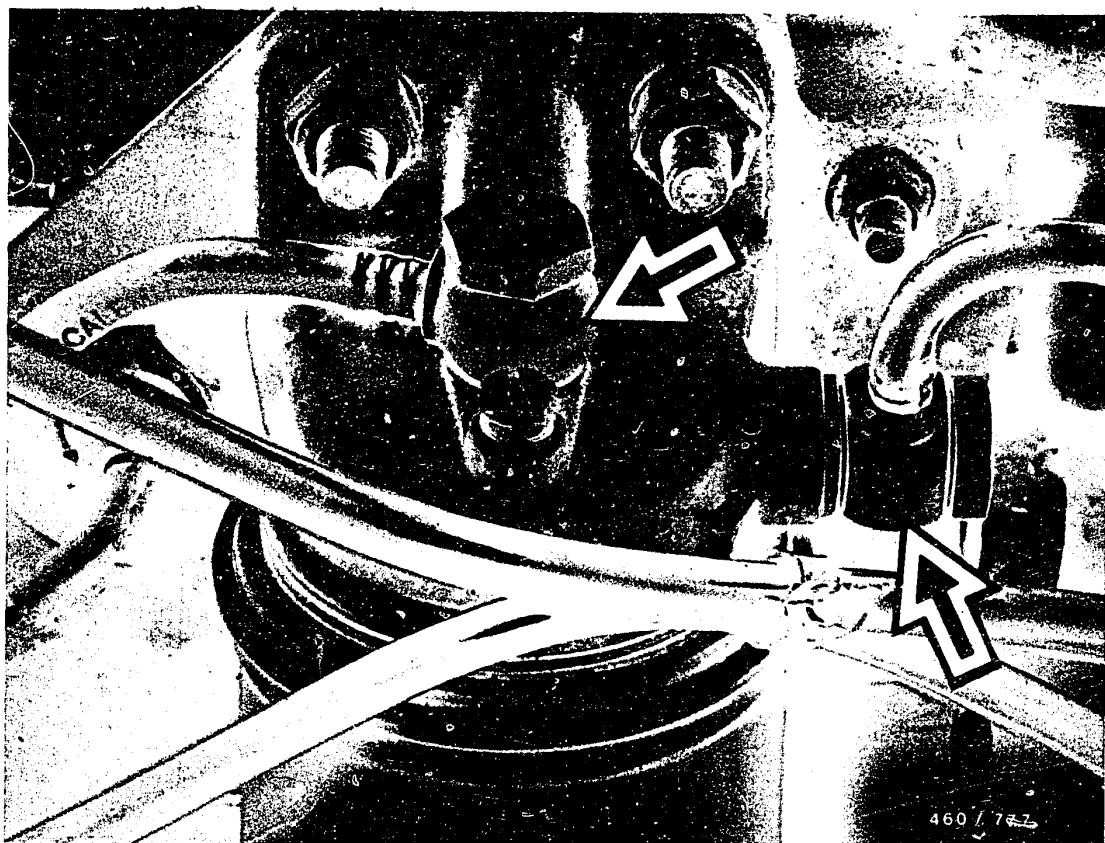
Catch liquid in collector vessel.

Tighten water-drain plug and bleeder screw and test for leaks.

If necessary, bleed fuel filter.





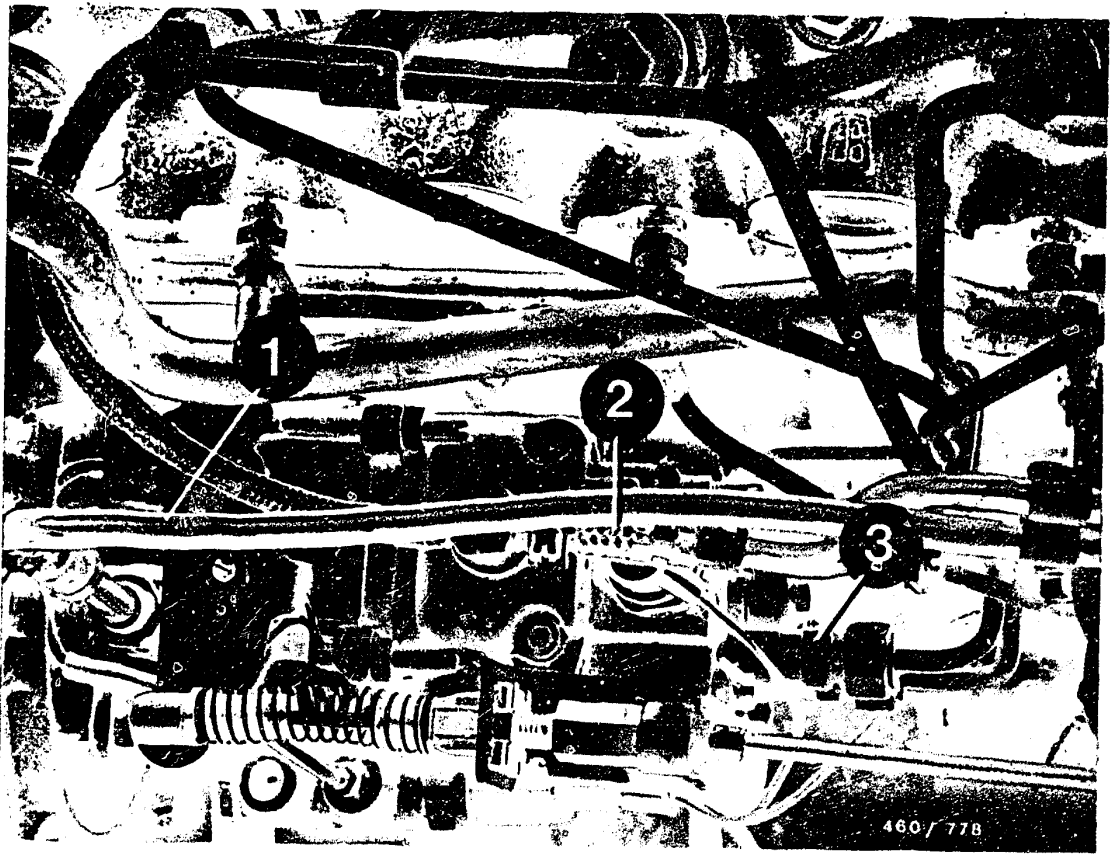


- Connections on fuel filter (arrows)

**B21**

Test injection system for leaks  
Ford Escort D, Fiesta D, Orion D

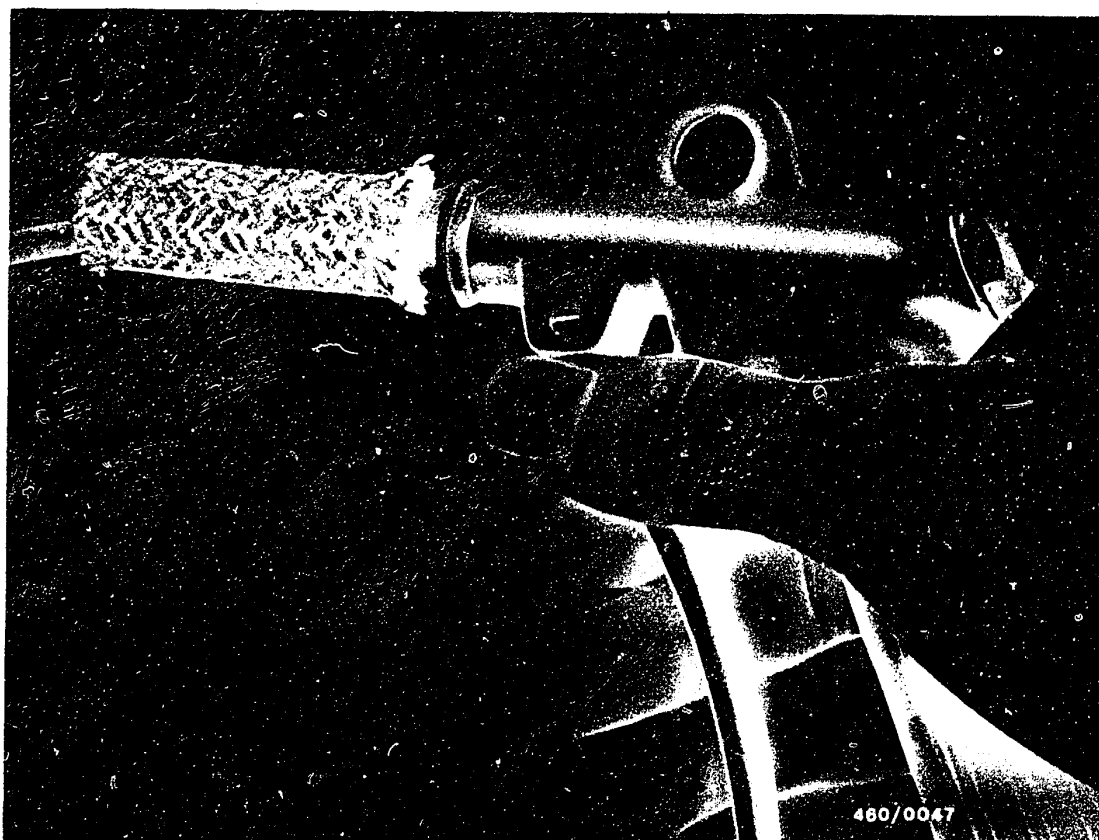




- Inlet (1) and return lines (2) on distributor-type injection pump.
- Delivery-valve holders on hydraulic head (3).

Examine fuel lines for hairline cracks.





## 16. Check fuel lines

Subject suspect fuel lines to a visual inspection.

If there is no detectable pinching or kinking, the fuel line in question must be removed.

Check fuel line for throughflow using compressed air and clean if necessary.

A suitable hose piece may be used as a side seal for blowing out the fuel lines.



## 17. Smoke test - check air filter

### 17.1 Smoke test

Summary of the contents of the legal regulations (as at April 1978). Applicable to Federal Republic of Germany.

This regulation applies only to the homologation of motor vehicles having at least 4 wheels with a maximum permissible speed of more than 25 km/h. A smoke emission test is not prescribed for official general inspections.

Parts which may have an influence on environmental pollution must be designed in such a way that the legal requirements are met during operation and despite vehicle vibration.

This applies in particular to cold-start devices and full-load stops. The Rheinland-Westfälische TÜV (Technical Inspection Bureau of Rhineland-Westfalia) in Essen is the sole approval agency.





### 17.1.1 Test setup

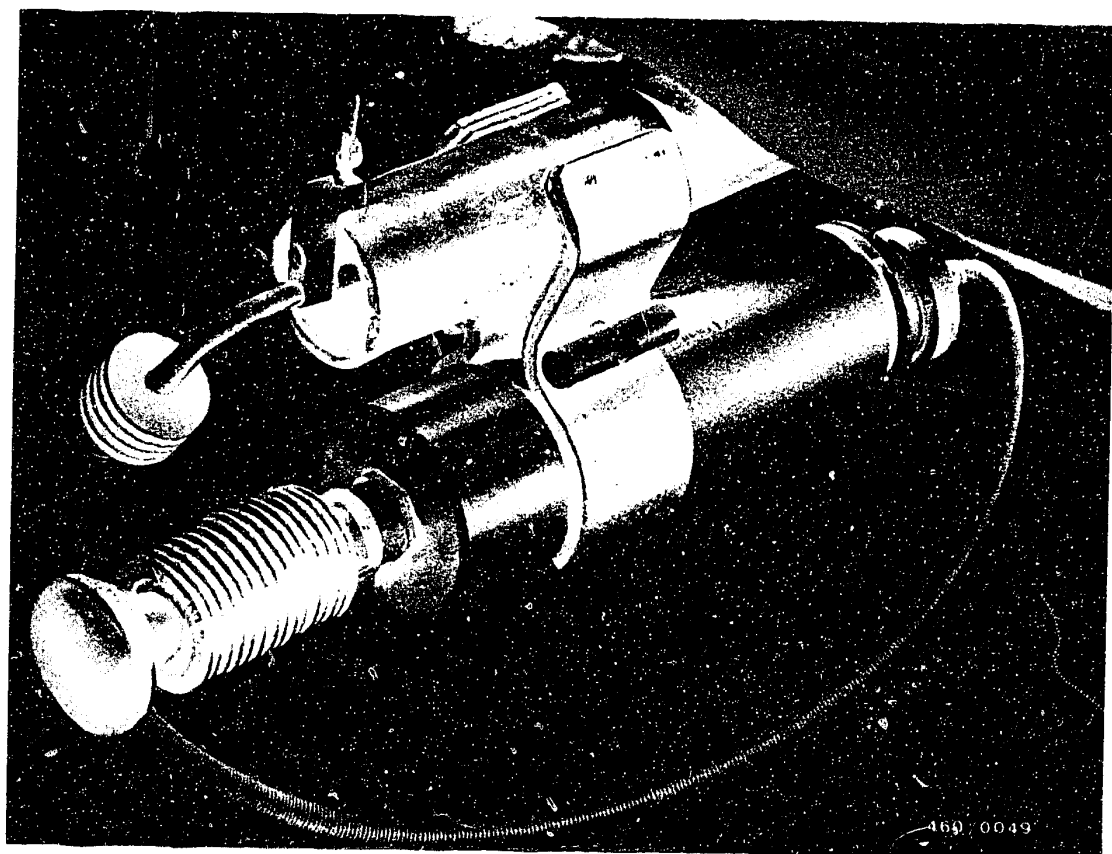
The smoke test is conducted using the Bosch filter-type smokemeter.

The filter-type smokemeter consists of the following units:

- Accessories box with proportioning pump 0 681 169 038
- Evaluating unit 0 684 102 050

Insert filter plate into proportioning pump.





Mount sampling pump on exhaust pipe using appropriate clamp.

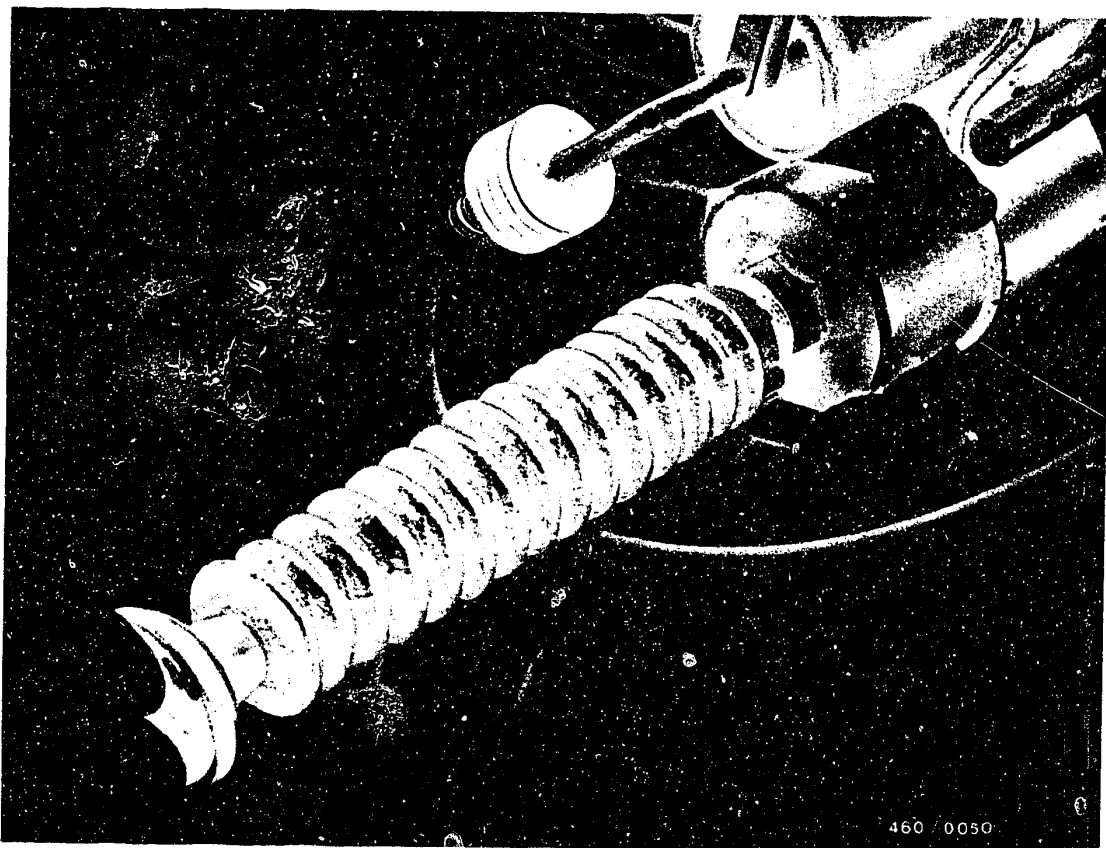
Introduce exhaust-sample pickup as far as possible into exhaust pipe and clamp in position.

**C2**

Smoke test

Ford Escort D, Fiesta D, Orion D





### 17.1.2 Test procedure

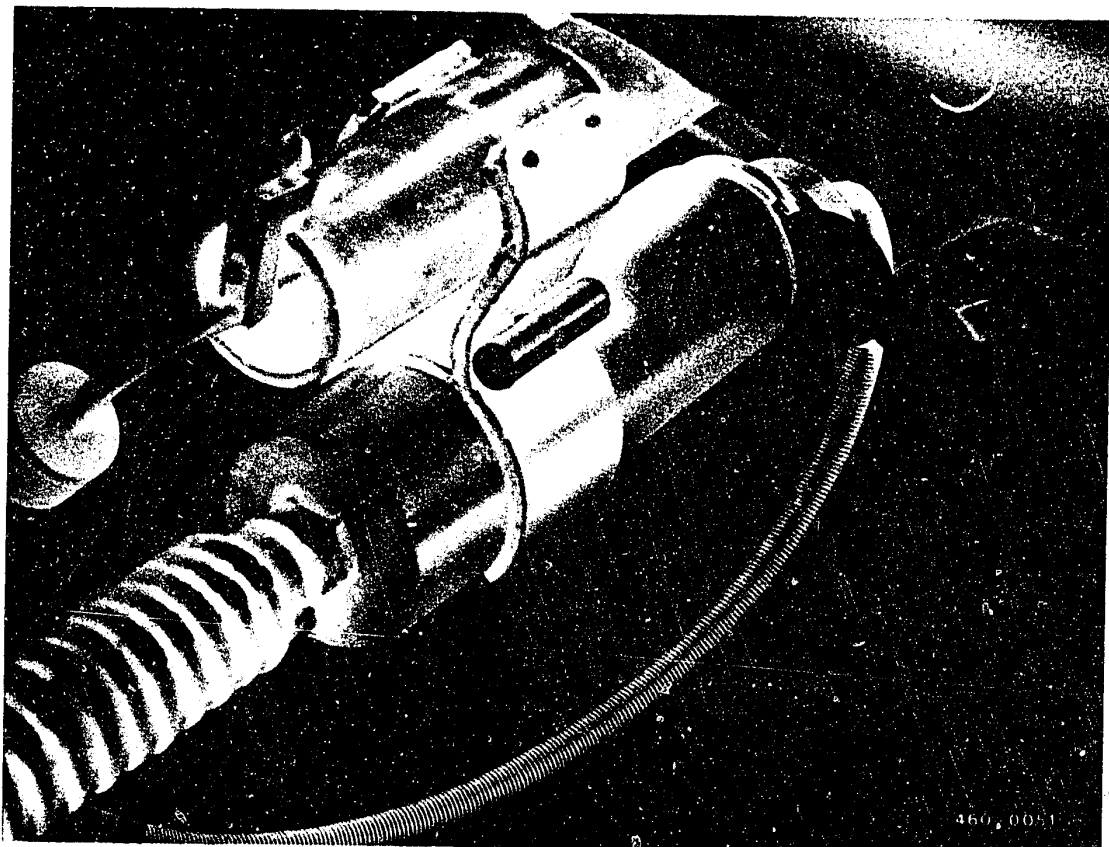
Set proportioning pump by pressing in the black push-button.

Take rubber ball on triggering hose and enter passenger compartment.

The test can be performed on the chassis dynamometer or on the road (gradient).

The chassis dynamometer is preferable in any case. Find the gear in which, with the accelerator pedal in the full-load position, a speed of approx. 40 km/h is reached. Load the engine so that, with the accelerator in the same position, a speed of approx. 25 km/h is reached.





Maintain this load condition for 5 seconds and then trigger the sampling pump by pressing the rubber ball.

Switch off engine.

Caution!

During the following operation, pay attention to the fact that the exhaust pipe has been heated due to the running of the engine.

Remove filter plate from sampling pump.

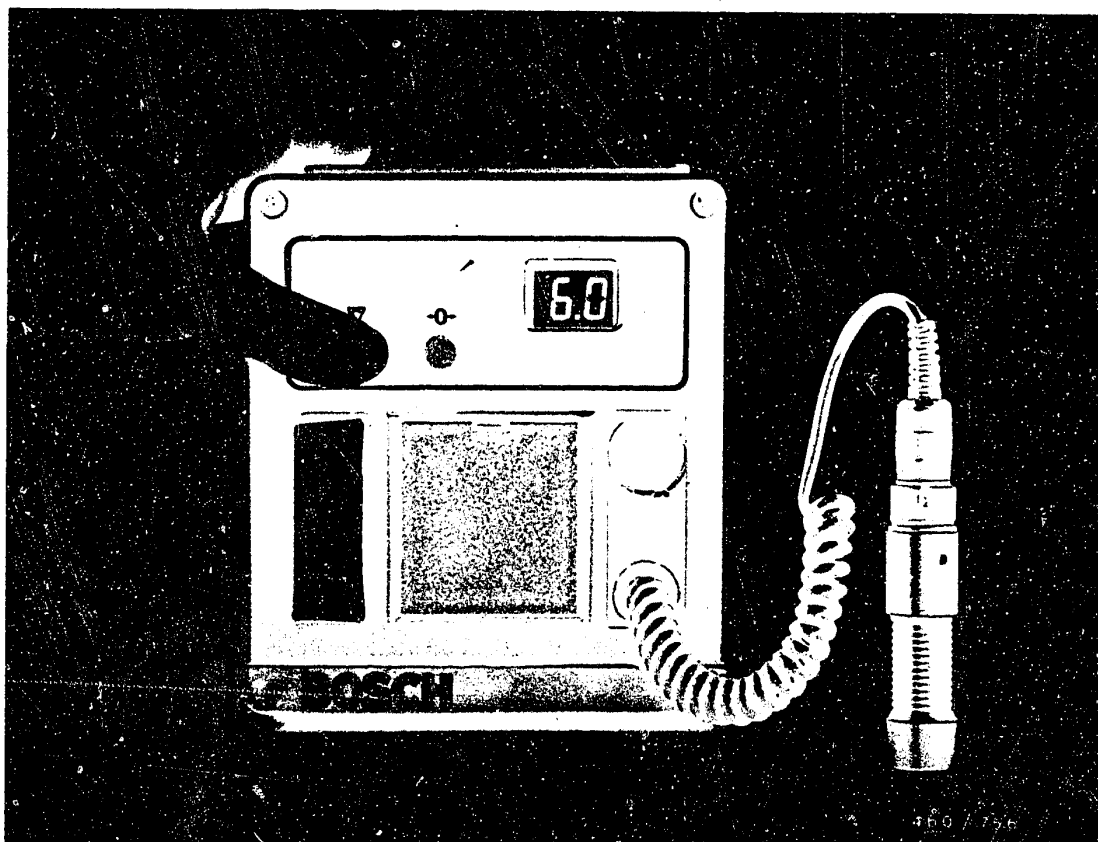
**C4**

Smoke test

Ford Escort D, Fiesta D, Orion D







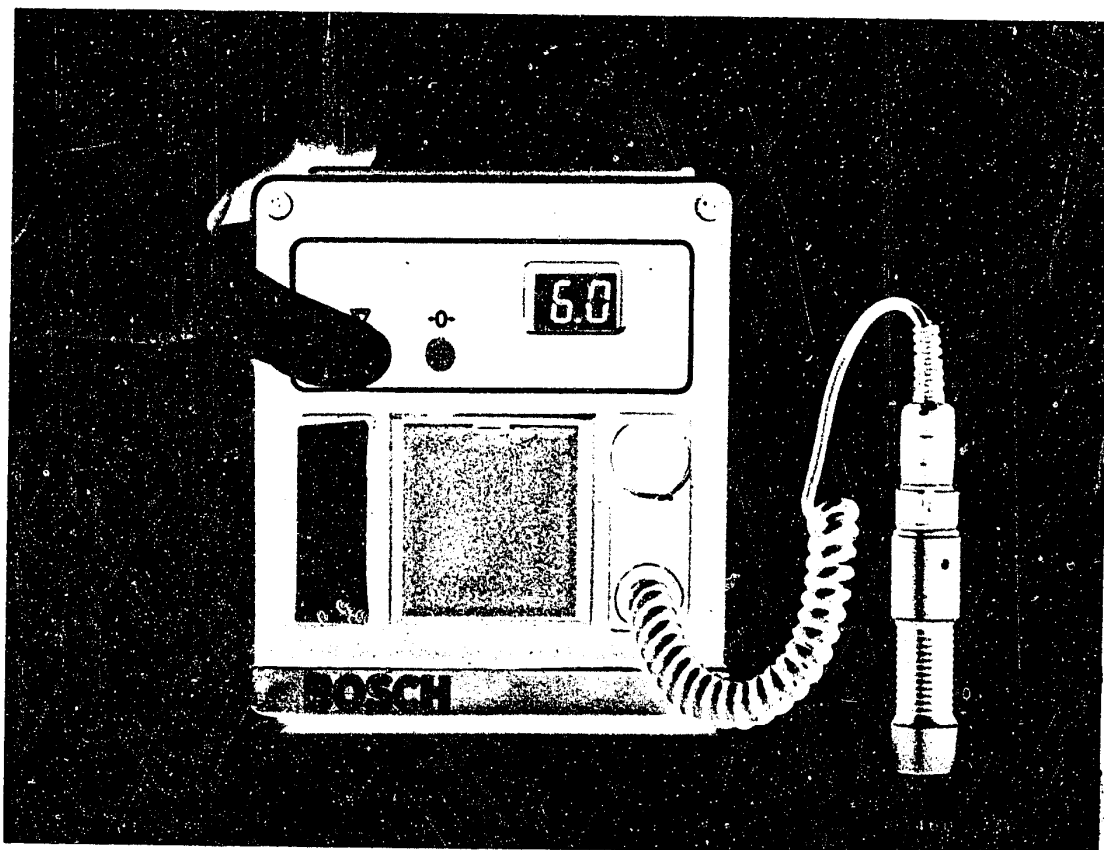
### Setting the zero point

The zero point adjustment must be performed

- before each series of measurements
- if there are changes in the ambient conditions
- whenever the lens of the photo element adapter has been cleaned.

Firmly press the measuring head of the photo element adapter onto 5 clean white filter plates placed one on top of the other.

Press button "0" until display 0.0 appears.  
Release button "0".



### Measuring

With sooted side at the top, place filter plate from metering unit on 3 new filter plates placed one on top of the other.

Press measuring head vertically onto black surface of filter plate, while at the same time pressing button "C" until the measured smoke number appears on the display.

### Note:

Measuring head must be firmly mounted both for the zero point adjustment and for measuring (even slight tilting may lead to incorrect measurements).

Compare the smoke number with the evaluation sheet.  
Note kW (HP) information of vehicle manufacturer.



## 17.2 Check air filter

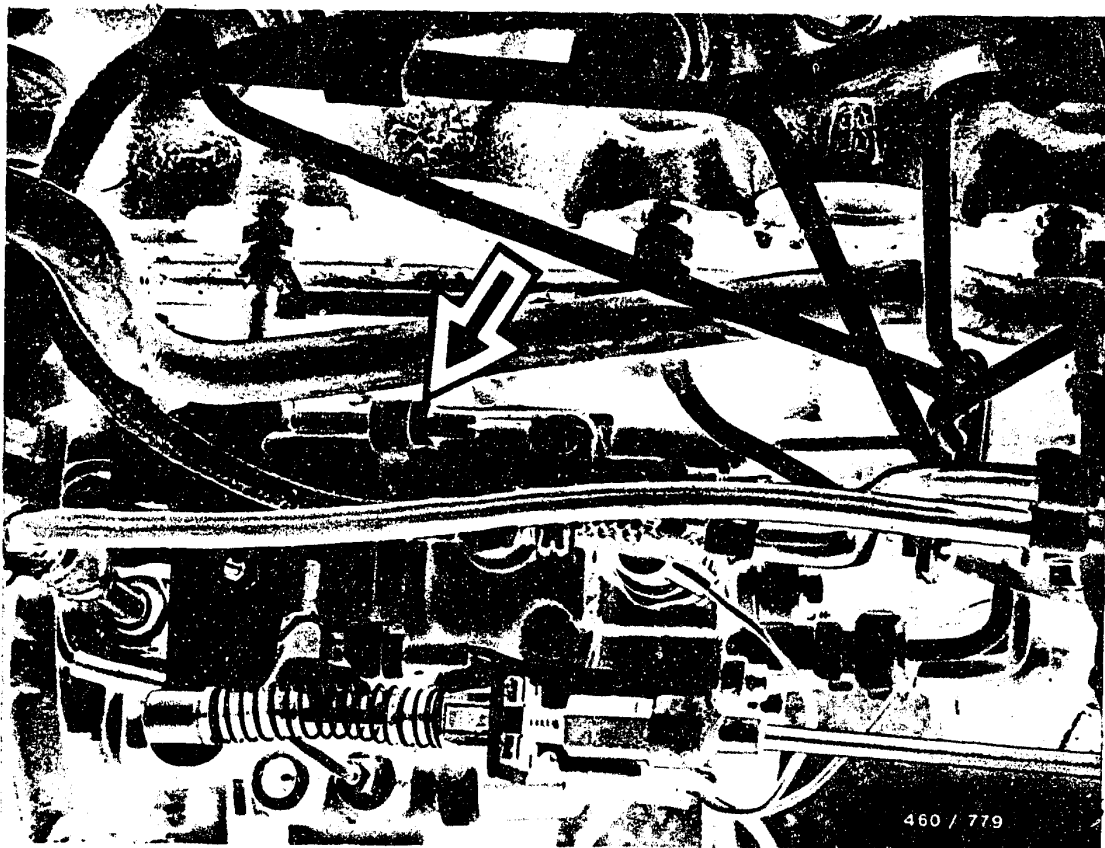
Remove air filter and subject to a visual examination.

### Test criteria for air filter:

- Dusty air filter (test by knocking out air filter)
- Oil-fouled air filter
- Solid matter in air filter, e. g. leaves.

If in doubt, use a new filter element.





### 18. Adjust idle speed

Connect tachometer (e. g. photo-electric) to engine.

#### Note:

For adjusting the idle speed, the engine must be at normal operating temperature. Coolant temperature  $+ 80^{\circ} \text{C.}$

Adjust engine speed to  $880 \pm 30 \text{ min}^{-1}$  at the idle-speed adjusting screw (arrow).

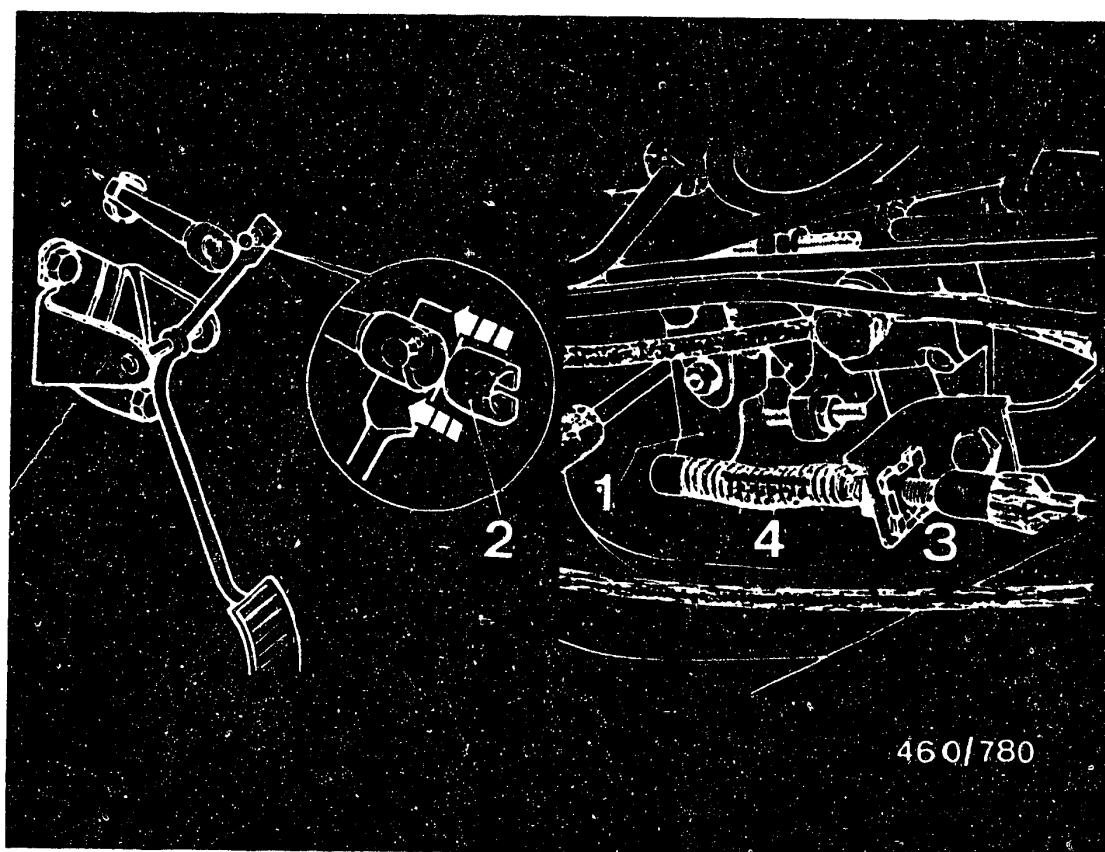
Note that the camshaft and the injection pump are driven at half the engine speed. After adjusting, lock adjusting screw and seal.

**C8**

Adjust idle speed

Ford Escort D, Fiesta D, Orion D





- 1 = Speed control lever      3 = Locking clip  
2 = Holding plate              4 = Spring

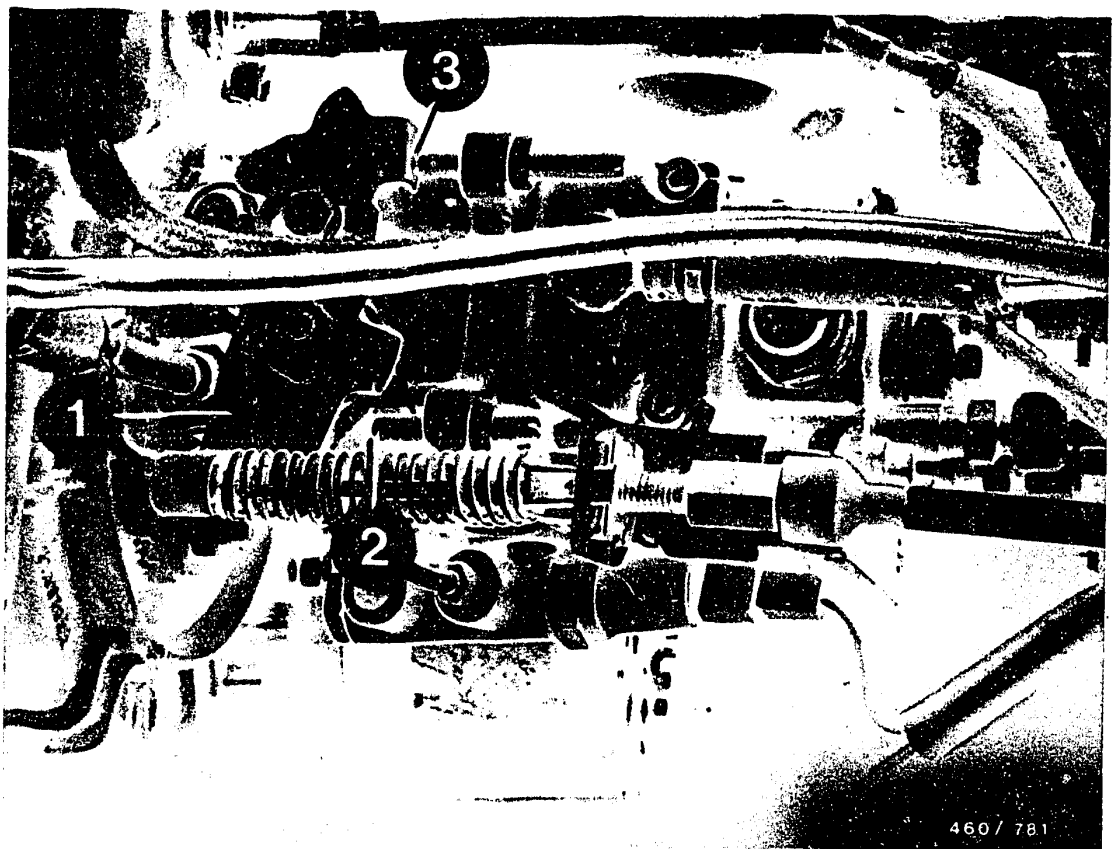
### 18.1 Adjust Bowden cable

Remove cable from speed control lever (1).

Remove holding plate (2) from accelerator pedal.

Remove locking clip (3) and relax spring (4).



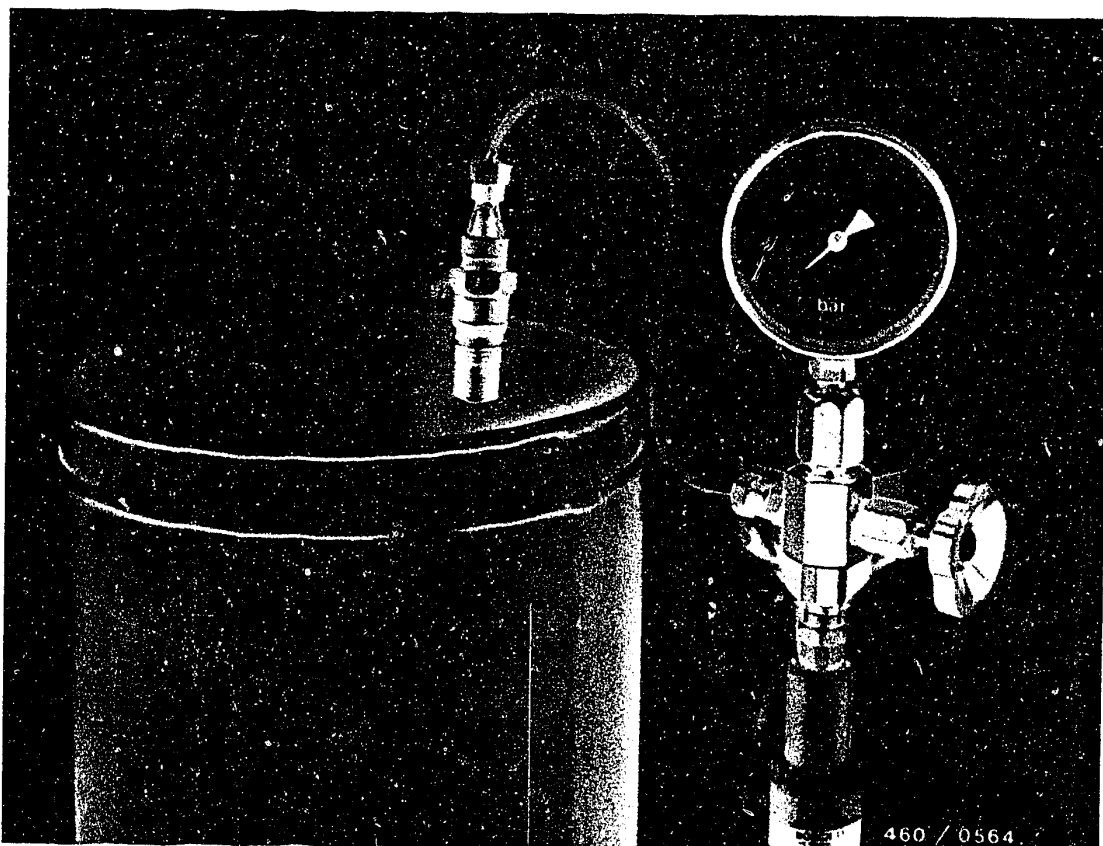


- 1 = Speed control lever
- 2 = Full-load stop
- 3 = Idle stop

Hook bowden cable into accelerator pedal and secure with holding plate (1).

Mount bowden cable so that when the accelerator pedal is moved the speed control lever is up against the full-load and idle stops.





### 19. Test injection nozzles

Remove injection nozzles.

The test is performed using the nozzle tester EFEP 60 H 0 681 200 502.

Mount injection nozzle with nozzle-holder assembly on nozzle tester.

#### Caution!

When testing injection nozzles, make sure that the fuel spray does not strike your hands since, due to the high pressure, the fuel will penetrate into the skin and may cause blood poisoning.



### 19.1 Spray test

Switch off pressure gauge.

The spray pattern can only be assessed when the lever is moved quickly (approx. 4 - 6 strokes per second).

The spray must be quite concentrated and must be finely atomized in the form of a narrow perfect cone.

### 19.2 Chatter test

Pressure gauge off.

Fully depress lever of tester slowly (1 - 2 strokes per second).

Good nozzles must chatter as soon as fuel escapes.

### 19.3 Test injection pressure

Switch on pressure gauge.

Slowly press lever downward. When fuel begins to squirt, read off injection pressure.

If different from the set value, the nozzle-opening pressure must be corrected by means of shims behind the pressure spring in the nozzle holder.

Set value: 143 ± 7 bar

Thicker shims = higher nozzle-opening pressure

Thinner shims = lower nozzle-opening pressure

Shortening the spring travel by 0.05 mm results in an increase of the nozzle-opening pressure of 5.0 bar.

#### Note:

When assembling the injection nozzle, pay attention to the tightening torque of 70 - 90 Nm. If the tightening torque is exceeded, the nozzle needle may stick.



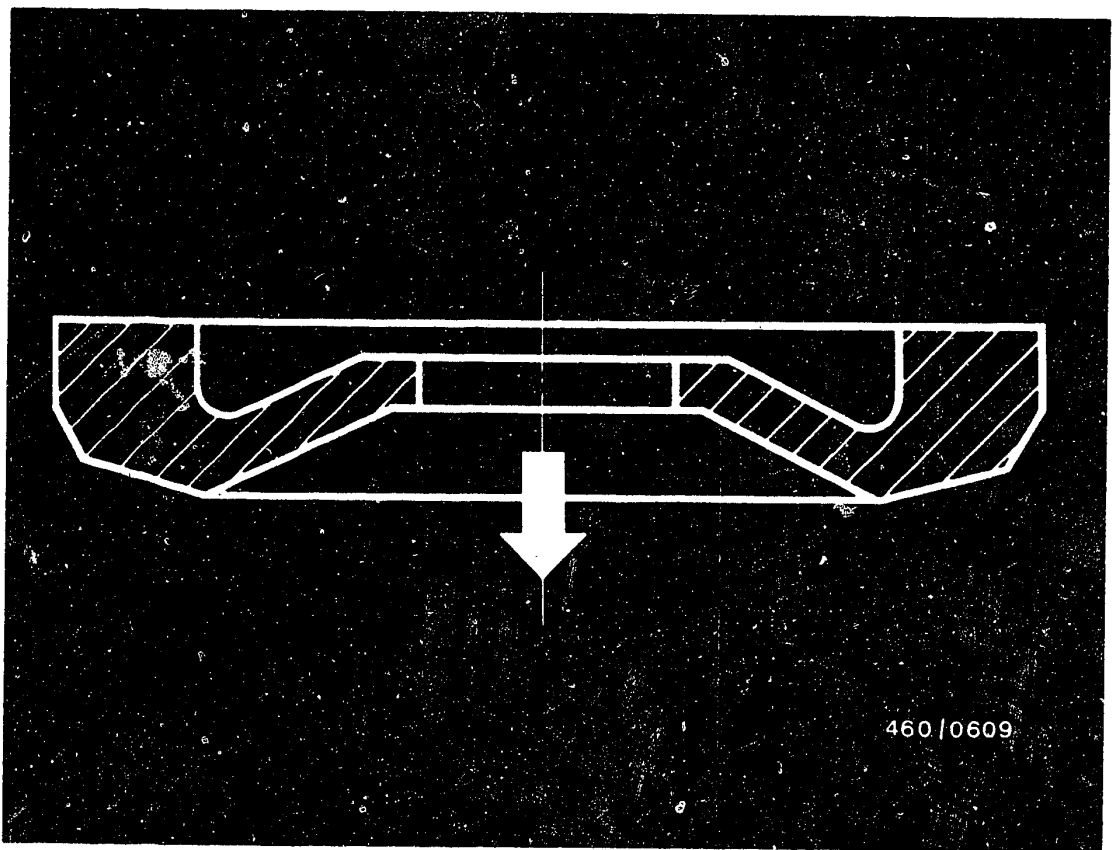


#### 19.4 Leak test

Pressure gauge on.

Slowly press lever downward and maintain pressure approx. 20 bar below the opening pressure for 10 seconds. No drop may fall from the nozzle.





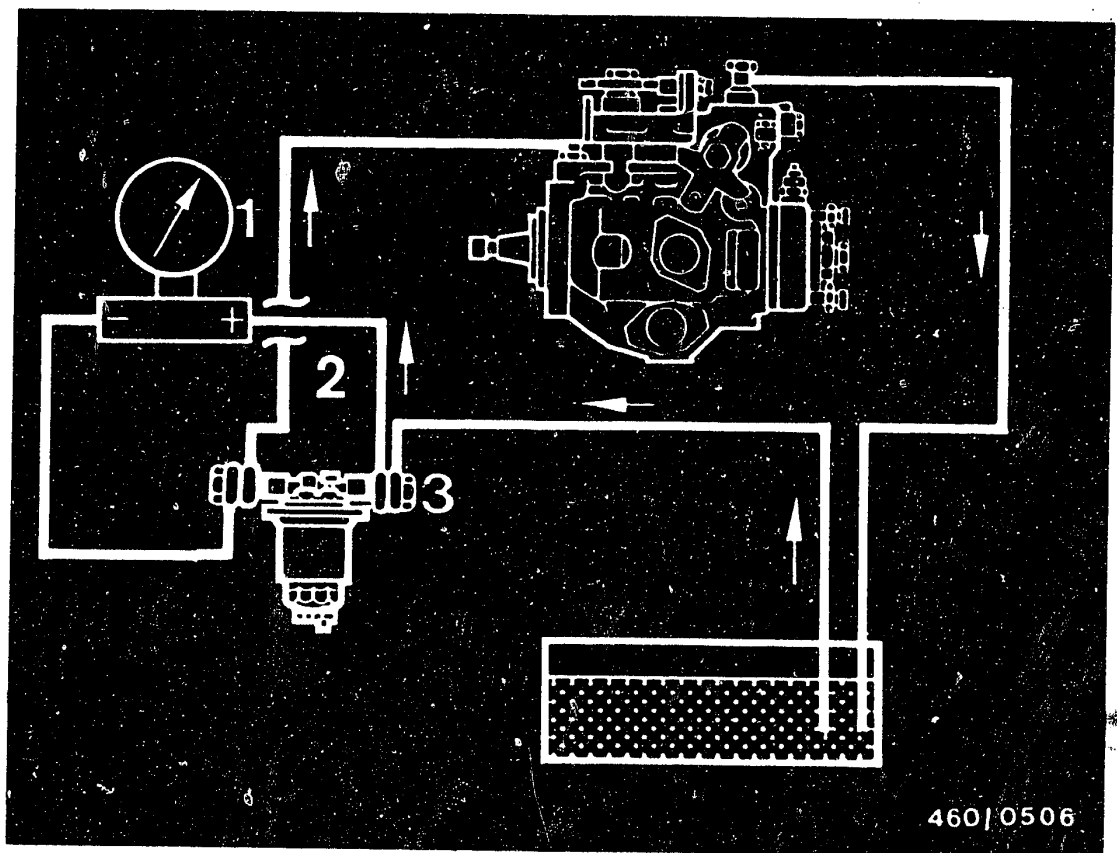
### 20.5 Install injection nozzles

Before installing the injection nozzles, fit a new heat seal in the direction of the arrow with respect to the cylinder head (picture).

Tighten nozzle-holder assemblies to 60 - 80 Nm.

Tighten union nuts of fuel-injection tubing to 15 - 25 Nm.





460/0506

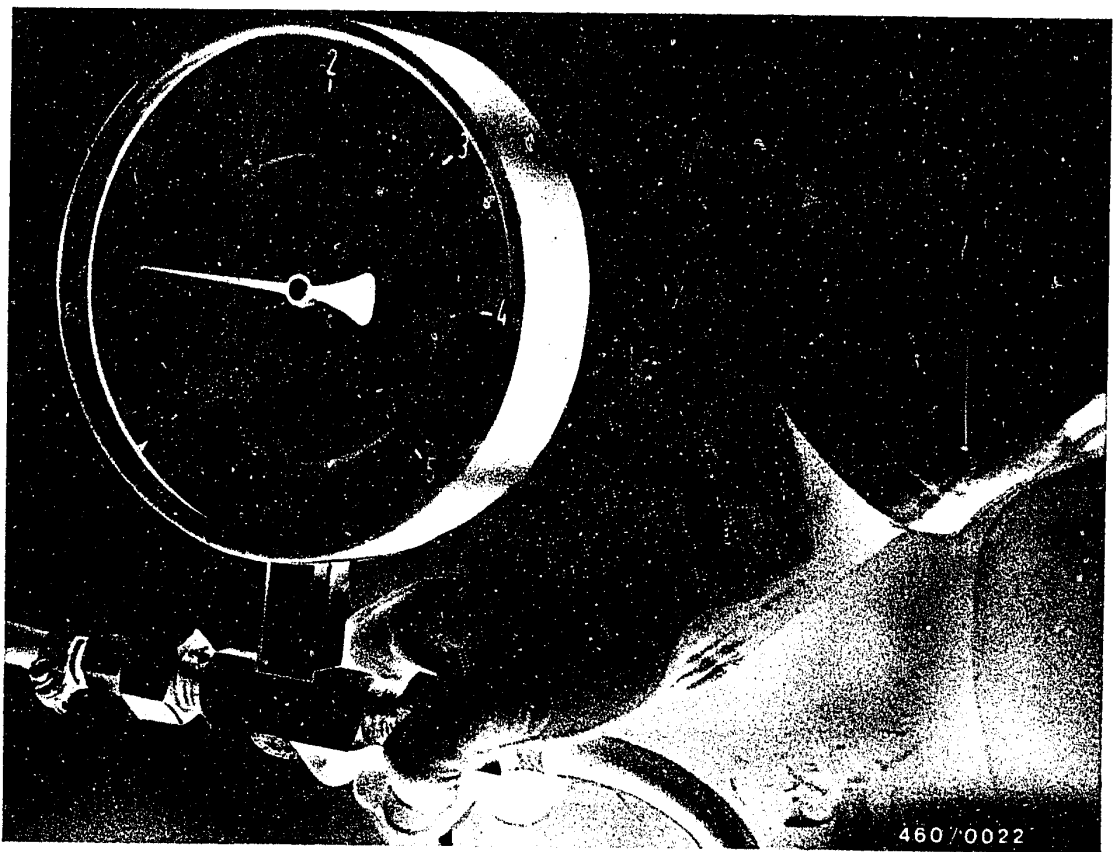
- 1 = Differential-pressure gauge
- 2 = Filter outlet (use inlet union and extra-long inlet-union screw 2 443 456 020).
- 3 = Filter inlet (use inlet union and extra-long inlet-union screw 2 443 456 020)

## 20. Check fuel filter

### 20.1 Connection diagram for filter test

Connect differential-pressure gauge to fuel filter using appropriate connecting pieces.





Connect the (+) side of the differential-pressure gauge to the fuel filter inlet. Fit the (-) connection of the pressure gauge to the filter outlet. See connection diagram.

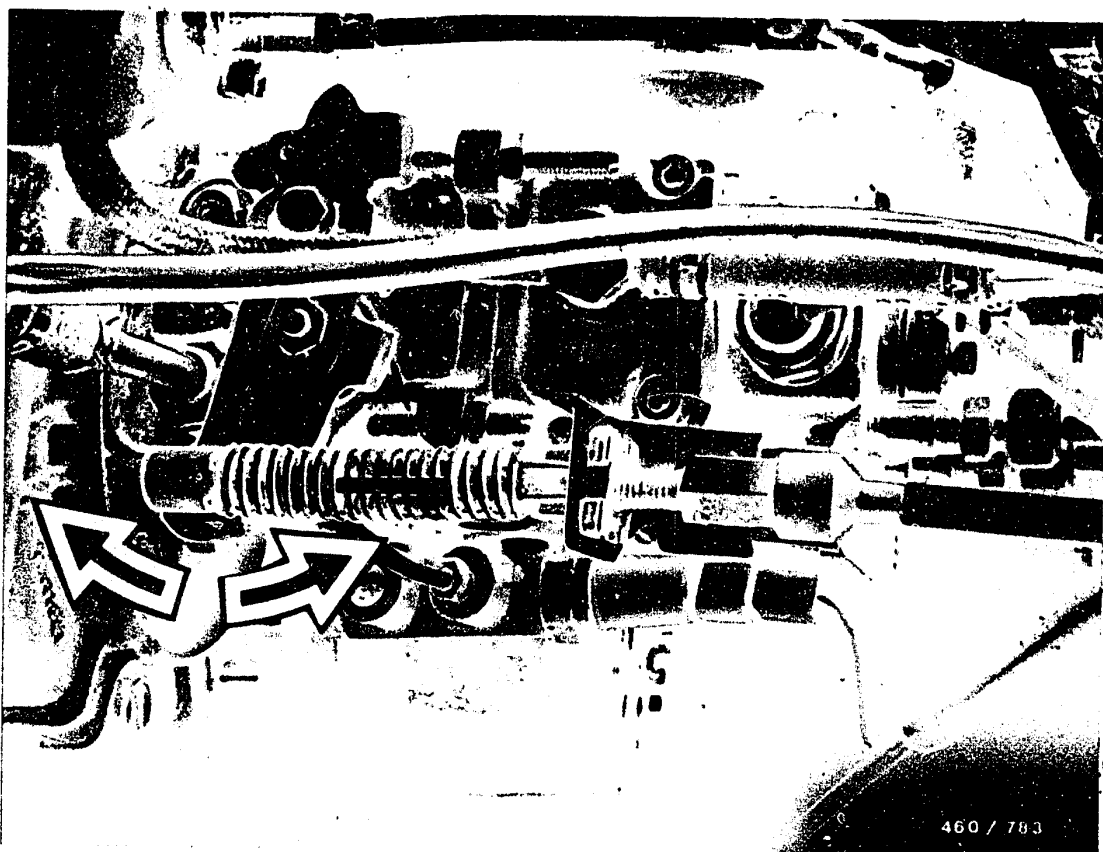
Run engine until you are sure that there is no air in the fuel system.

**C16**

Check fuel filter

Ford Escort D, Fiesta D, Orion D





Move injection-pump control lever briskly ( approx. 1 sec) from the idle stop to the maximum-speed stop.

Release control lever and read off differential pressure on pressure gauge.

The differential pressure may be max. 0.3 bar. If this value is exceeded, replace filter. Remove test connections.

If necessary, bleed fuel system.

**C17**

Check fuel filter

Ford Escort D, Fiesta D, Orion D



## 21. Test preheating system

### 21.1 Necessary test equipment

VA tester e.g. ETT 011.00 0 684 101 100

### 21.2 Workshop information

We recommend that the R-type sheathed-element glow plugs be replaced every 45 000 km.

#### Note:

Incorrect adjustment of the start of delivery may considerably shorten the service life of the sheathed-element glow plugs.

For each repeat start the glow-plug and starter switch must, in order to obtain renewed preheating, first of all be turned to position 1, then to position 2. This re-activates the safety circuit built into the glow-duration unit.

### 21.3 Preheating time

The on-time of the preheating system is dependent on the ambient temperature.

Before testing, make sure of the following:

Battery fully charged.

Compression O.K. If necessary, test compression loss.

Fuel supply/fuel-injection system O.K.



Starting motor operates, engine fails to start or starts only with great difficulty

Yes

### Test power supply to R-type sheathed-element glow plugs

Connect voltmeter to R-type sheathed-element glow plug and to ground.

Turn glow-plug and starter switch to position 1 and then to position 2. For at least 7 seconds (depends on temperature) a minimum voltage of 10 V must be indicated. After this time the system switches off automatically.

#### Caution:

If the measurement has to be repeated, first of all turn glow-plug and starter switch to position 1 and then to position 2.

Minimum voltage present?

Yes

### Test start repeater lamp

Turn glow-plug and starter switch to position 1 and then to position 2.

Start repeater lamp must light up.

Start repeater lamp lit?

Yes

Continued on C21/C22

No

1. If voltage below 10 V, then test power circuit (battery +) as well as term. 30 and term. 87 of glow-duration unit for voltage drop. Eliminate voltage drop.

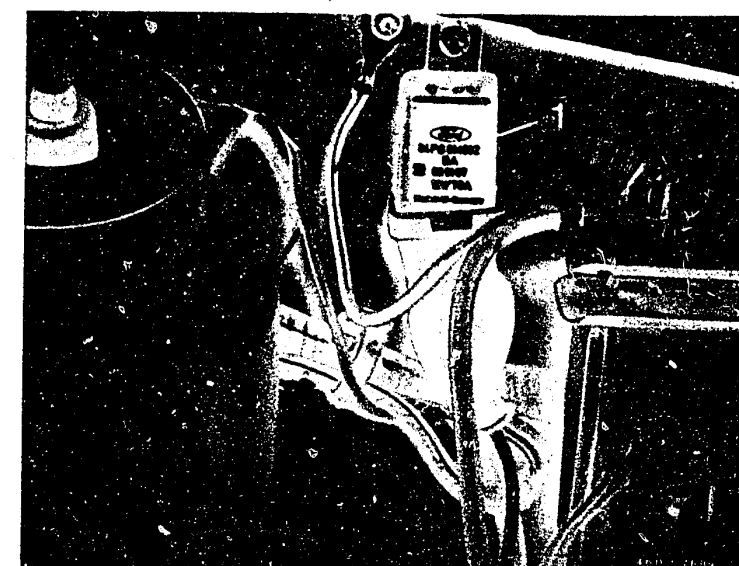
2. If no voltage, then test lead from R-type sheathed-element glow plug to glow-duration unit term.87 for open circuit. Eliminate open circuit. If no open circuit, then continue on Coordinate D1/2. Continuation from here not necessary.

No

1. Test lead from glow-plug and starter switch term. 15 to glow-duration unit term.86 for open circuit. Eliminate open circuit.

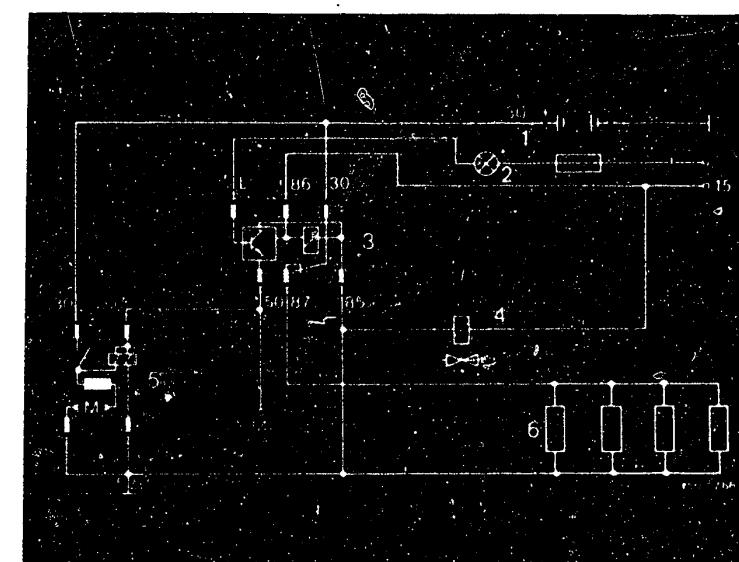
2. Test lead from glow-duration unit term. L including start repeater lamp as well as its ground connection for open circuit. Eliminate open circuit.

3. Test ground lead term. 85 from glow-duration unit for open circuit. Eliminate open circuit.



Installation position of glow-duration unit (in engine compartment on right).

- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs



**C19**

Test preheating system

Ford Escort D, Fiesta D, Orion D

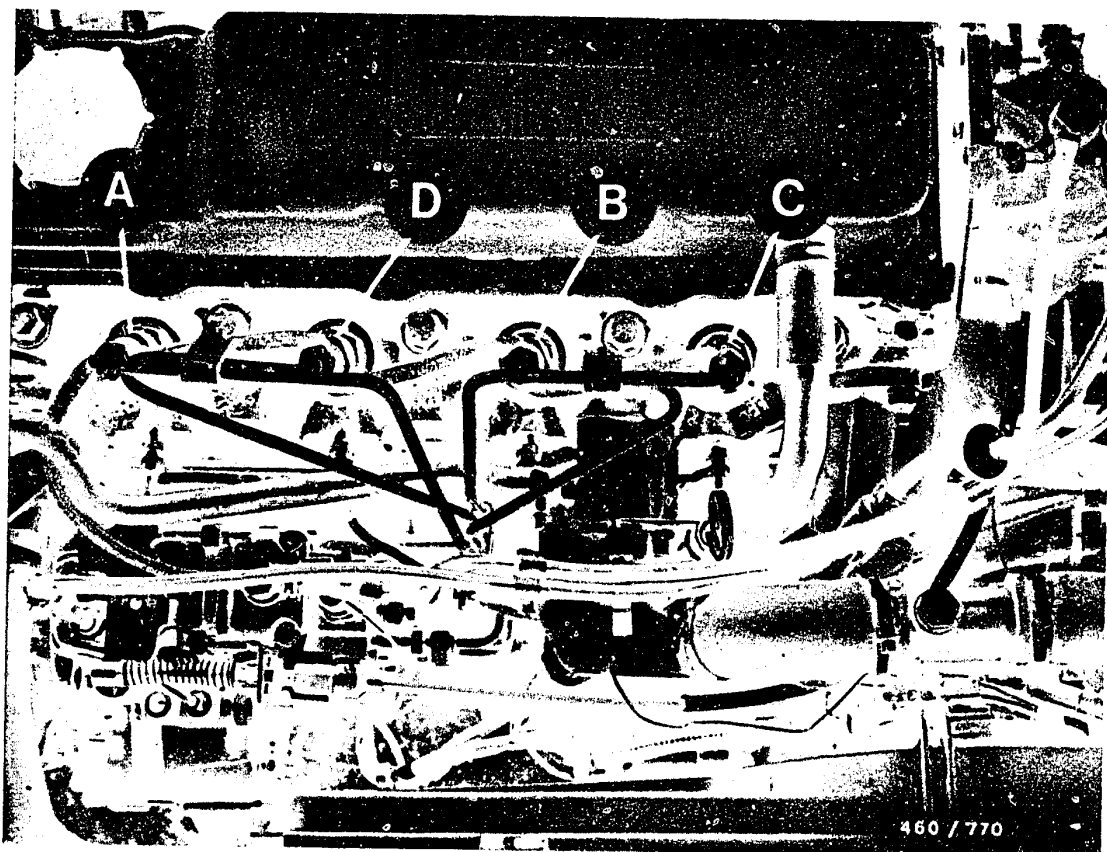


**C20**

Test preheating system

Ford Escort D, Fiesta D, Orion D





### 15. Test injection system for leaks

The leak test must be performed with the engine at normal operating temperature.

For the leak test, examine all connection points of the fuel lines.

Check all connection points of fuel lines.

Pay particular attention to:

- Connections at nozzle-holder assemblies A...D.





## Test preheating system (continued)

Yes

### Test preheating time

Turn glow-plug and starter switch to position 1 and then to position 2.

Preheating time (start repeater lamp lit) must be as follows for the following ambient temperatures:

The preheating time (start repeater lamp lit) must be approx. 7...12 seconds with the engine cold.

Preheating time (seconds) O.K.?

No

Replace glow-duration unit.

Yes

### Test safety switch-off circuit

Connect voltmeter to R-type sheathed-element glow plug and to ground.

Turn glow-plug and starter switch to position 1 and then to position 2.

The voltmeter must indicate voltage for approx. 20...25 seconds depending on the ambient temperature.

After the specified time the voltmeter must indicate 0 V.

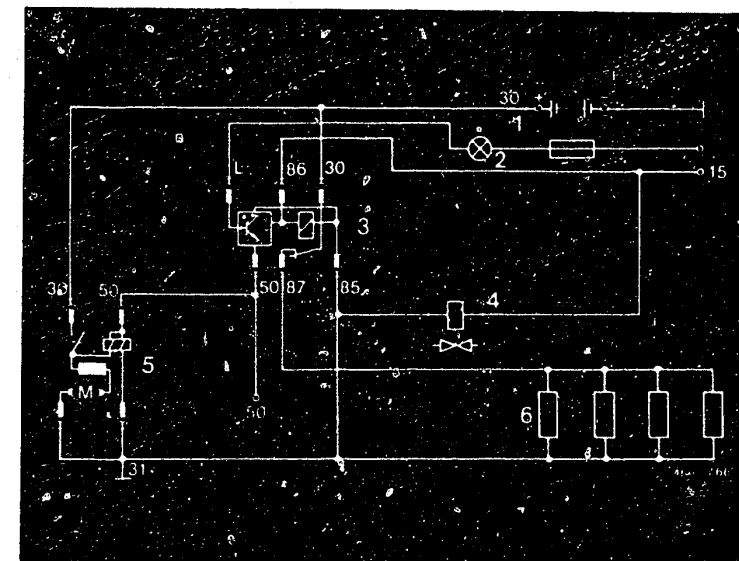
Voltmeter at 0 V after the specified time?

No

Replace glow-duration unit.

Yes

Continued on C23/C24



- 1 = Battery
- 2 = Glow-plug indicator lamp
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs

**C21**

Test preheating system

Ford Escort D, Fiesta D, Orion D

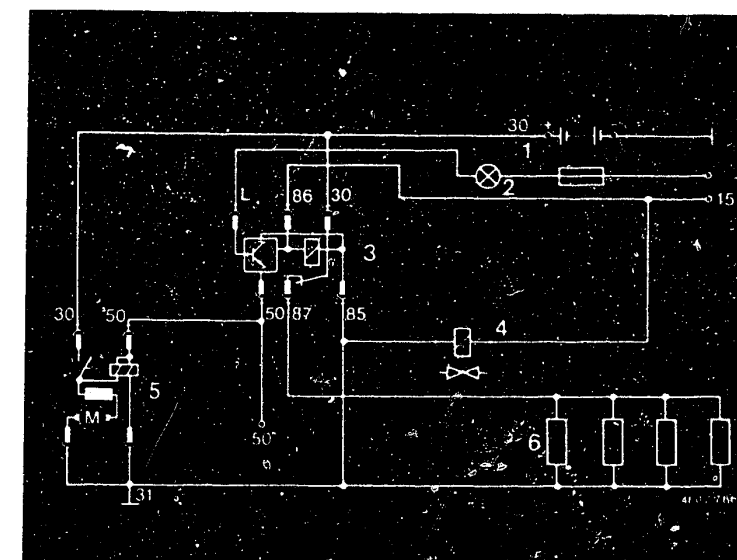
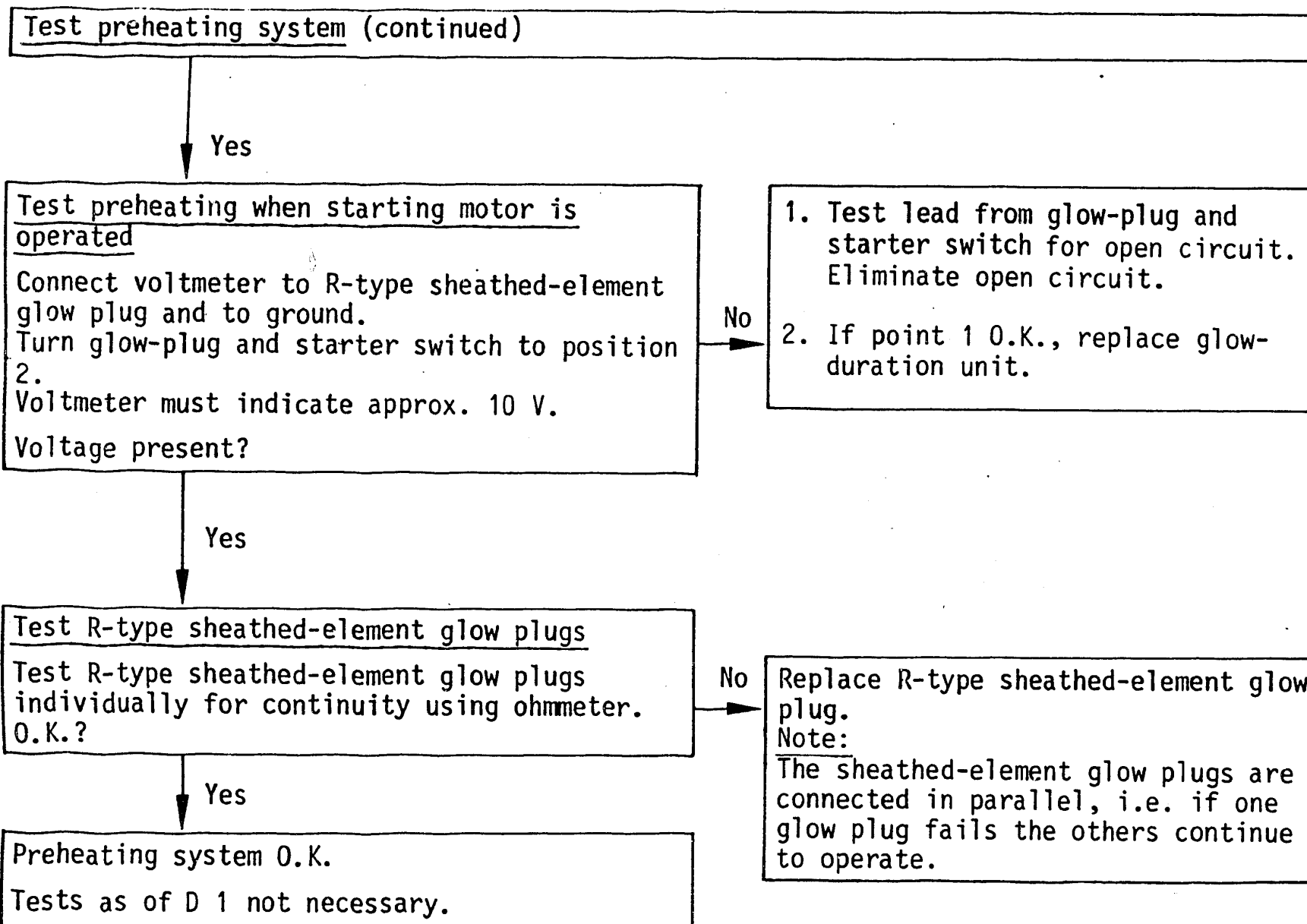


**C22**

Test preheating system

Ford Escort D, Fiesta D, Orion D





- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow-plugs

**C23**

Test preheating system

Ford Escort D, Fiesta D, Orion D



**C24**

Test preheating system

Ford Escort D, Fiesta D, Orion D



# Test preheating system (continued from C19/C20)

## Test voltage at glow-duration unit term.

Connect voltmeter to glow-duration unit term. 86 and to ground.  
Turn glow-plug and starter switch to position 1 and then to position 2.  
Voltmeter must indicate battery voltage.  
Battery voltage present?

Yes

Test ground lead term. 85 from glow-duration unit.  
Connect voltmeter to glow-duration unit term. 85 and battery +.  
Voltmeter must indicate battery voltage.  
Battery voltage present?

Yes

Test voltage at glow-duration unit term. 30  
Connect voltmeter to glow-duration unit term. 30 and to ground.  
Voltmeter must indicate battery voltage.  
Battery voltage present?

Yes

Voltage now present at R-type sheathed-element glow plug?

Yes

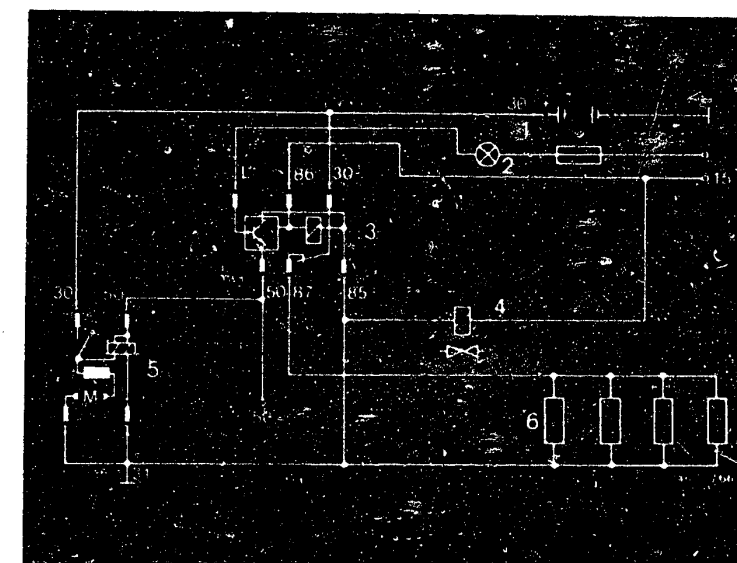
Continued on D3/D4

Test lead from glow-duration unit term. 86 to glow-plug and starter switch for open circuit.  
Eliminate open circuit.

Test ground lead term. 85 from glow-duration unit for open circuit.  
Eliminate open circuit.

Test lead from glow-duration unit term. 30 to battery + for open circuit.  
Eliminate open circuit.

Replace glow-duration unit.



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs

D1

Test preheating system

Ford Escort D, Fiesta D, Orion D



D2

Test preheating system

Ford Escort D, Fiesta D, Orion D



**Test preheating system (continued)**

Yes

**Test start repeater lamp**  
 Turn glow-plug and starter switch to position 1 and then to position 2.  
 Start repeater lamp must light up.  
 Start repeater lamp lit?

No

1. Test lead from glow-plug and starter switch term. 15 to glow-duration unit term. 86 for open circuit.  
 Eliminate open circuit.
2. Test lead from glow-duration unit term. L including start repeater lamp as well as its ground connection for open circuit.  
 Eliminate open circuit.
3. Test ground lead term. 85 from glow-duration unit for open circuit.  
 Eliminate open circuit.

Yes

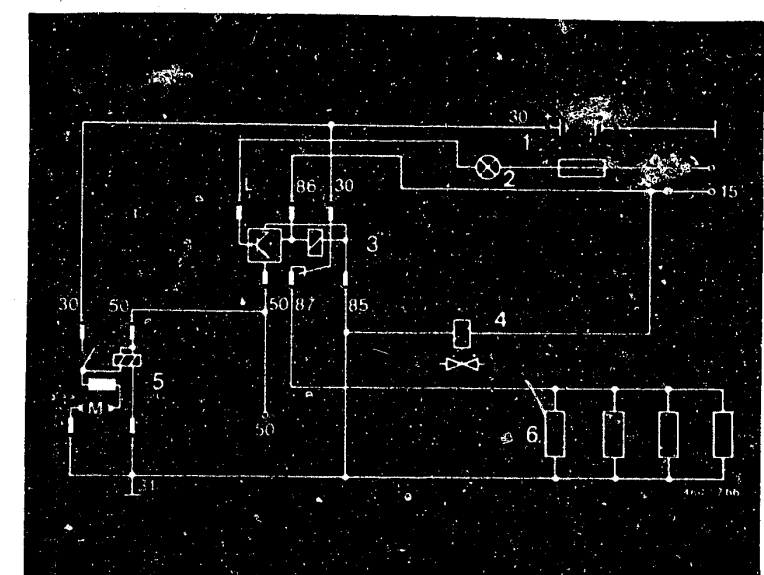
**Test preheating time**  
 Turn glow-plug and starter switch to position 1 and then to position 2.  
 The preheating time (start repeater lamp lit) must be approx. 7...12 seconds with the engine cold.  
 Preheating time (sec.) O.K.?  
 Preheating time (sec.) O.K.?

No

Replace glow-duration unit.

Yes

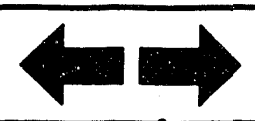
Continued on D5/D6



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs

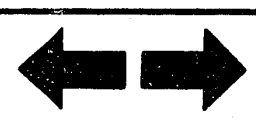
**D3**

Test preheating system  
 Ford Escort D, Fiesta D, Orion D



**D4**

Test preheating system  
 Ford Escort D, Fiesta D, Orion D



## Test preheating system (continued)

Yes

### Test safety switch-off circuit

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position 1 and then to position 2. The voltmeter must indicate voltage for approx. 20...25 seconds depending on the ambient temperature.

After the specified time the voltmeter must indicate 0 V.  
Voltmeter at 0 V after the specified time?

No

Replace glow-duration unit.

Yes

Test preheating when starting motor is operated.

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position 2. Voltmeter must indicate approx. 10 V.

Voltage present?

No

1. Test lead from glow-plug and starter switch term. 50 for open circuit. Eliminate open circuit.
2. If point 1 O.K., replace glow-duration unit.

Yes

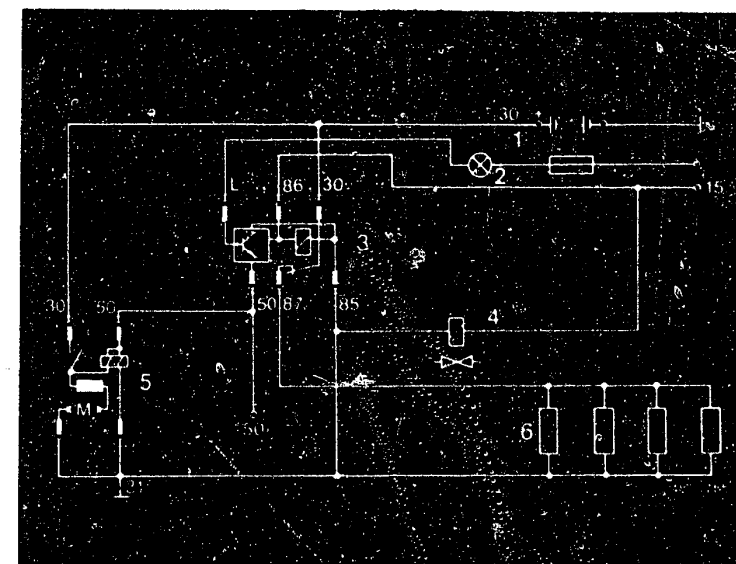
Test R-type sheathed-element glow plugs. Test R-type sheathed-element glow plugs individually for continuity using ohmmeter. O.K.?

No

Replace R-type sheathed-element glow plug.  
Note:  
The glow plugs are connected in parallel, i.e. if one glow plug fails the others continue to operate.

Yes

Preheating system O.K.



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow-plugs

D5

Test preheating system

Ford Escort D, Fiesta D, Orion D

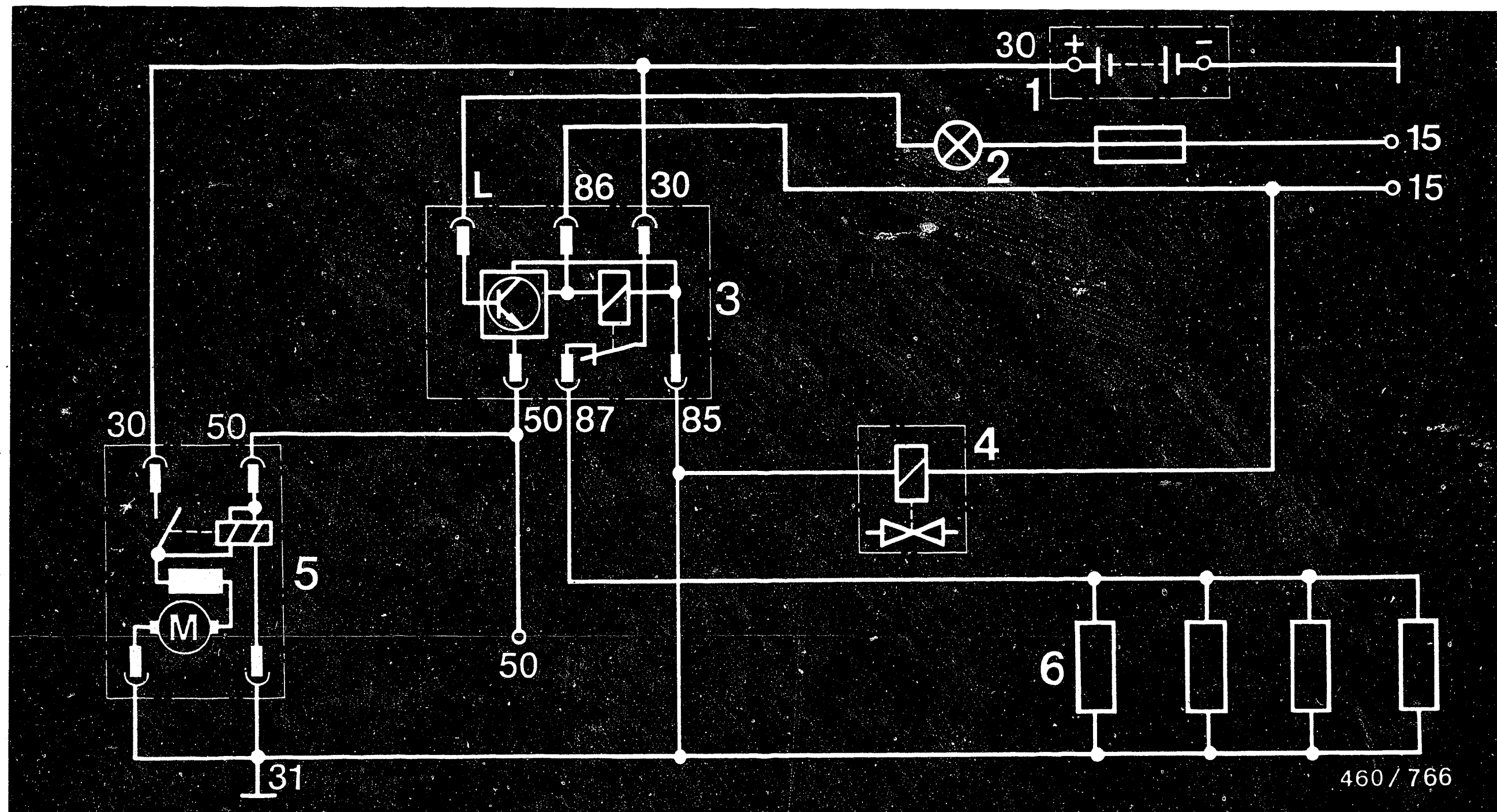


D6

Test preheating system

Ford Escort D, Fiesta D, Orion D





1 = Battery  
2 = Glow-plug indicator lamp

3 = Glow-duration unit  
4 = Solenoid-operated valve

5 = Starting motor  
6 = Sheathed-element glow plugs

Terminal diagram for preheating system

**D7**

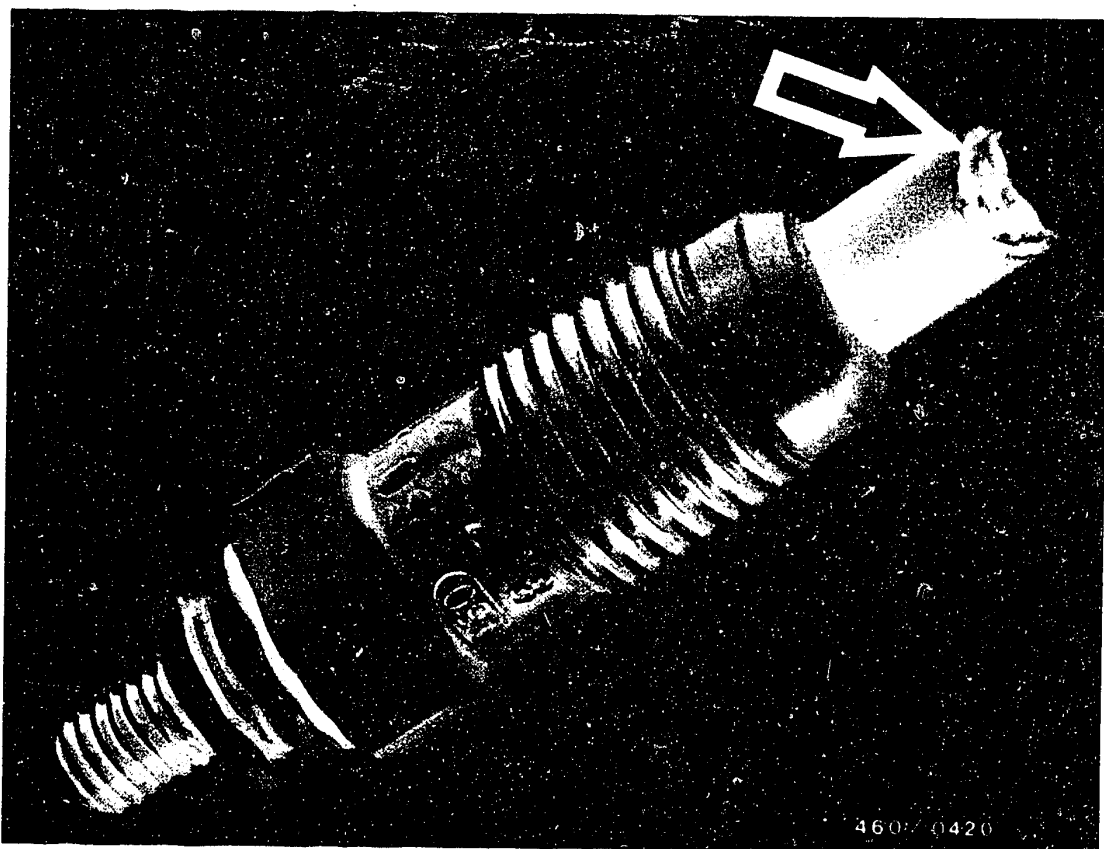
Test preheating system  
Ford Escort D, Fiesta D, Orion D



**D8**

Test preheating system  
Ford Escort D, Fiesta D, Orion D





Note:

Glow plugs with burned elements

Glow plugs with burned elements are frequently the result of troubles with the injection nozzle.

If glow plugs are found to have burned elements (arrow), it is not sufficient simply to replace them. The injection nozzles must also be tested for spray pattern, chattering, pressure and leaks.



## 22. Check timing device

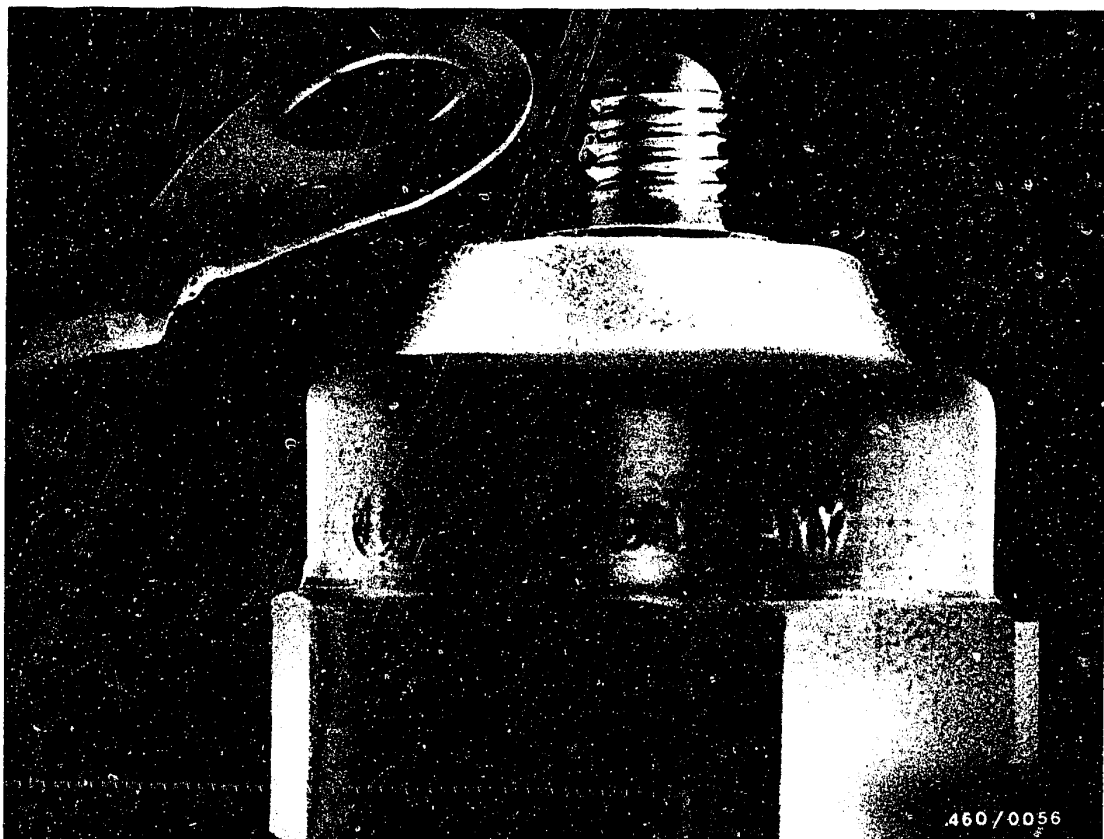
In distributor-type fuel-injection pumps VE..F.. the timing device is integral with the fuel-injection pump.

In order to test the timing device, it is necessary to remove the fuel-injection pump.

Perform the test on the injection-pump test bench.







## 23. Measure engine compression and compression loss

### 23.1 Measure engine compression

Fit new chart in compression tracer. Mount high-pressure hose on tracer. Switch off engine. In order to prevent fuel from being injected, remove connecting cable from shutoff magnet on distributor-type fuel-injection pump (picture).



Unscrew sheathed-element glow plugs and use suitable connecting nipple for compression tester.

With the aid of the starting motor turn the engine over several times so that loose deposits are removed from the compression space.

Screw in connecting nipple.

Mount high-pressure hose of compression tester on connecting nipple.

During the following operation, pay particular attention to the first compression stroke.

Operate starting motor until there is no longer any detectable pressure rise on the compression tracer.

Bleed compression tracer by pressing on bleed valve.

The pointer returns to the starting position.

Move chart into next position.

Mount connecting nipple on following cylinders and repeat measurement.

Compression pressure:	32 bar
at cranking speed and with engine warm:	min. 20 bar

Allowable difference between cylinders:	max. 6 bar
---	------------



## 23.1.1 Evaluation of chart

### 1. Normal pressure rise

If piston rings and valves are in good condition, the first compression stroke shows the highest pressure increase.

During the following compression strokes the compression builds up to the maximum pressure.

### 2. Gradual pressure rise

If, from the start, the compression increases only gradually on each piston stroke, this points to burnt valve seats or defective valve guides.

### 3. Low maximum pressure

If the maximum pressure obtained is too low on all cylinders, this points to defective pistons, piston rings or valves.

If the compression is too low on two neighbouring cylinders, this points to a leaky cylinder head gasket.



#### 4. Varying compression

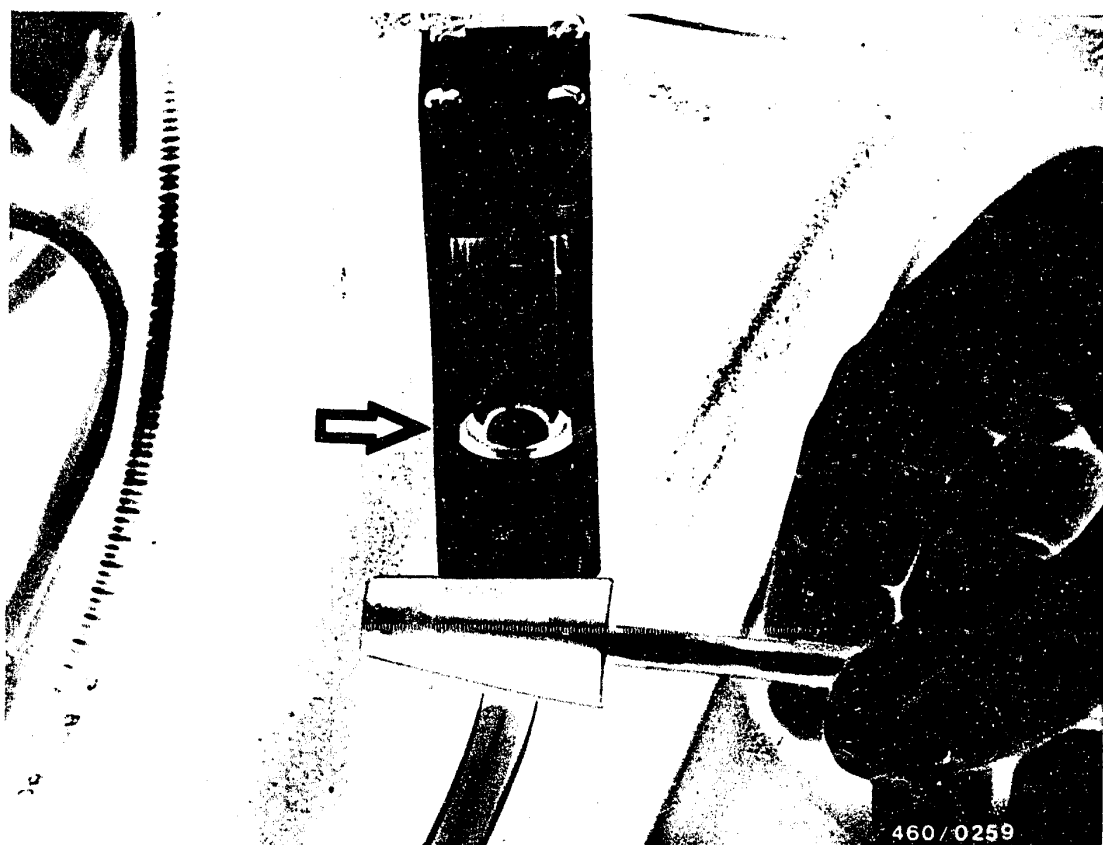
If one cylinder shows a clearly lower compression, proceed as follows: fill in 2-3 cm<sup>3</sup> of engine oil through the opening of the sheathed-element glow plug or nozzle-holder assembly and operate starting motor briefly.

Repeat measurements and compare charts. If there is a clear increase in compression during the second test, then the piston rings or cylinders are worn. If there is no change in the result, then defective valves are the cause.

#### 5. Uniform compression

Uniform compression is extremely important with regard to the smooth running of the engine. Maximum compression is, therefore, not the only objective.





### 23.1 Measure compression loss of engine

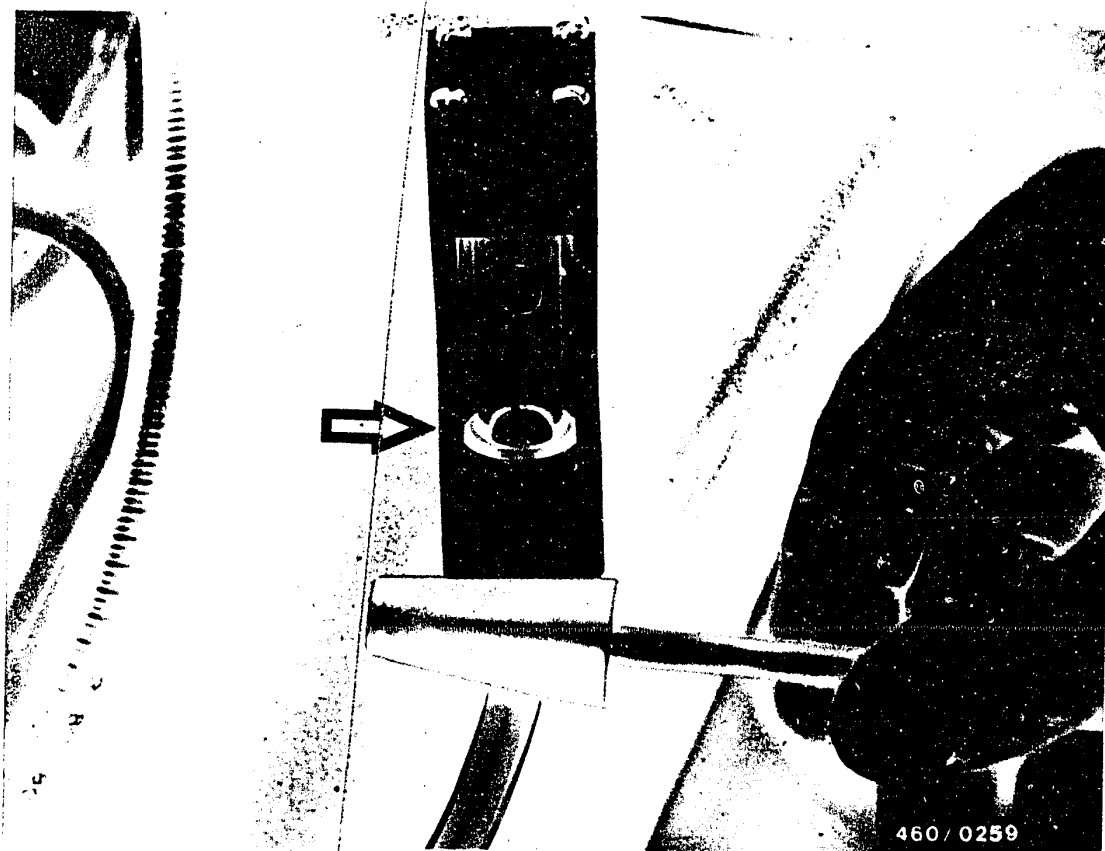
The test is performed using the Bosch compression-loss tester 0 681 001 901 (EFAW 210 A).

For testing, the respective piston must be at TDC (TDC = top dead centre) on the compression stroke.

For setting this position, use DC detector 1 688 132 025 (included in accessories with compression-loss tester).

Perform test with engine at normal operating temperature (temperature of water approx. 80 °C).





### 23.2.1 Set top dead centre

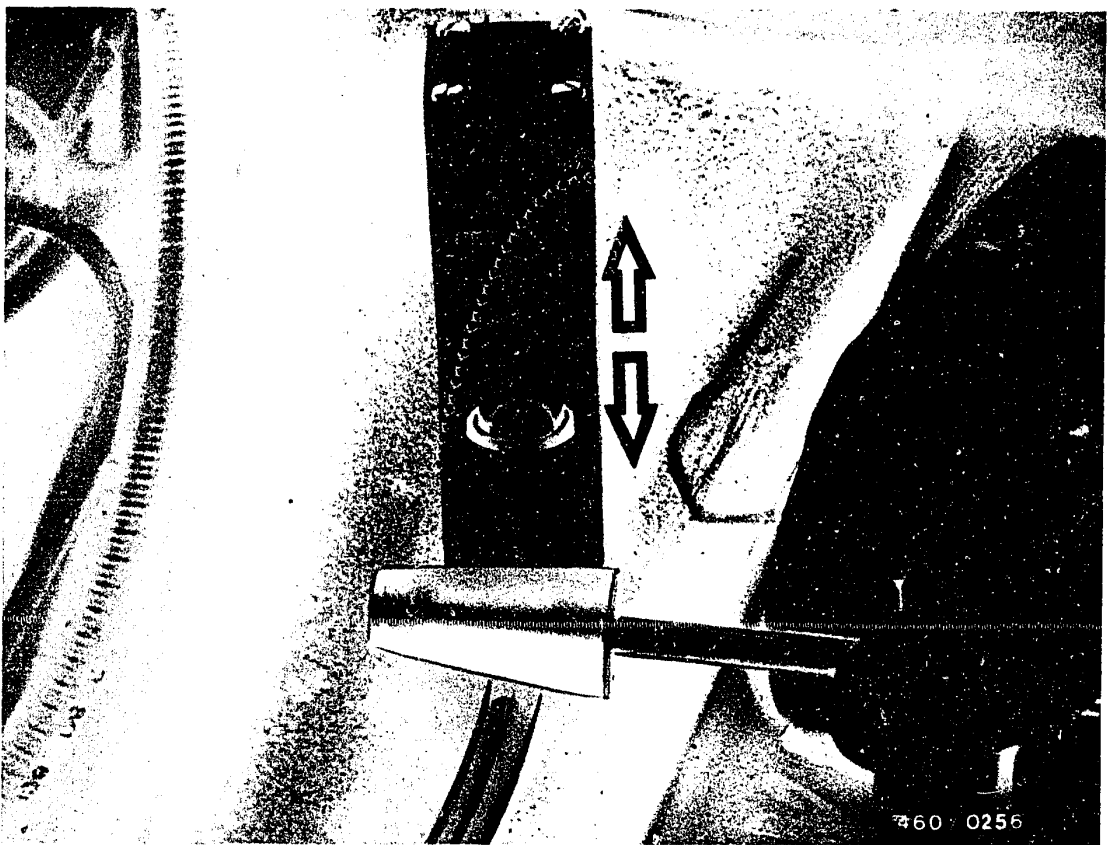
Remove sheathed-element glow plug from cylinder 1.

Insert rubber plug of DC detector into bore for sheathed-element glow plug.

Using magnetic clamp, mount glass cylinder in as vertical a position as possible in the engine compartment. The piston of the unit must be easily visible.

Slowly turn over crankshaft by hand in engine direction of rotation. (If necessary, select gear and push vehicle).





On the compression stroke, the piston of the DC detector is forced upwards.

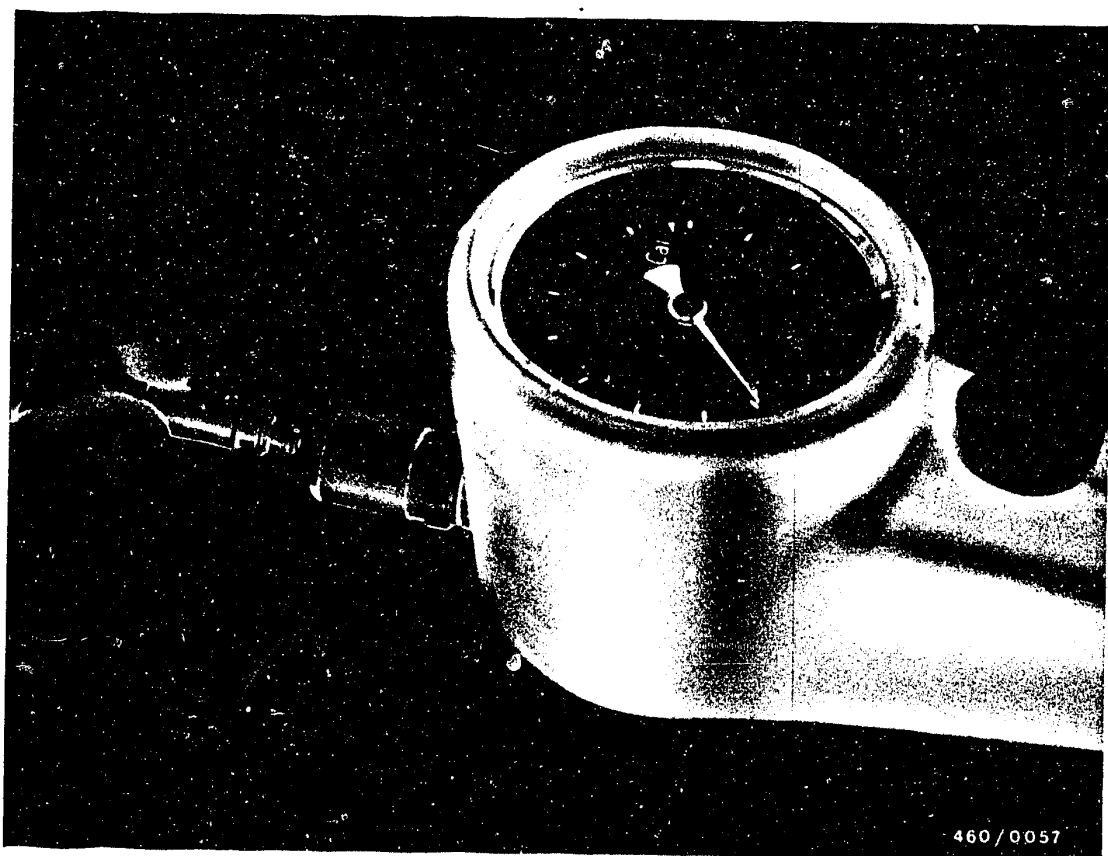
As top dead centre is passed over, the piston slides down again immediately.

Find top dead center by carefully turning the crankshaft backward and forward.

**D17**

Measure engine comp. and comp. loss  
Ford Escort D, Fiesta D, Orion D





### 23.2.2 Measure compression loss

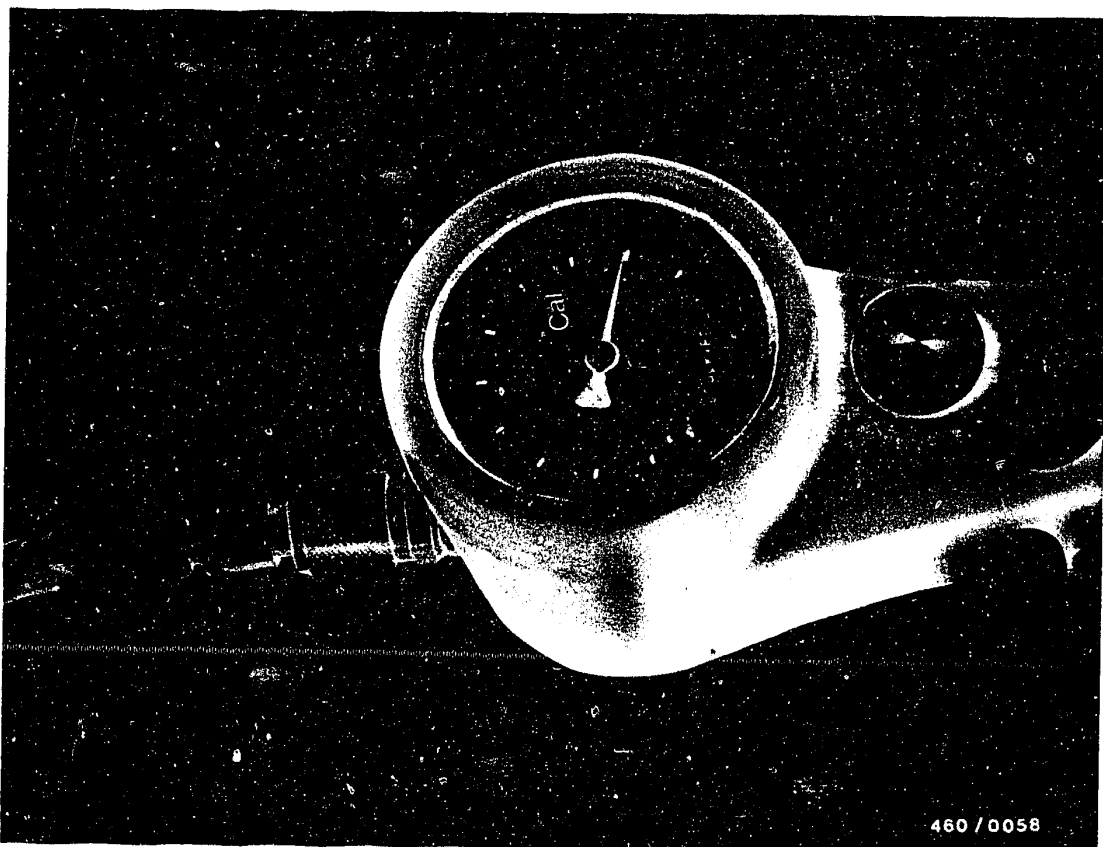
Connect tester to compressed-air mains.

Connect calibrating nozzle 1 680 363 036. Set a compression loss of  $23 \pm 1\%$  (marking "Cal".) at the knurled thumbscrew on the pressure-regulating valve. Disconnect calibrating nozzle.

(Instrument indicator must show approximately 0% compression loss - equipment check.)







Screw in fitting and mount test hose.  
Select gear and pull on handbrake.  
Connect test hose to tester.  
Read off compression loss in % on instrument.

Note:

Before testing the next cylinder, turn the engine over briefly without pre-heating using the starting motor so that the oil film re-forms.



### 23.2.3 Evaluation of test

The compression loss indicated should not exceed 25%.

Differences of 10% between the individual cylinders can be ignored.

The causes of greater losses can be located because the air makes a noise as it escapes.

Listen at the following points:

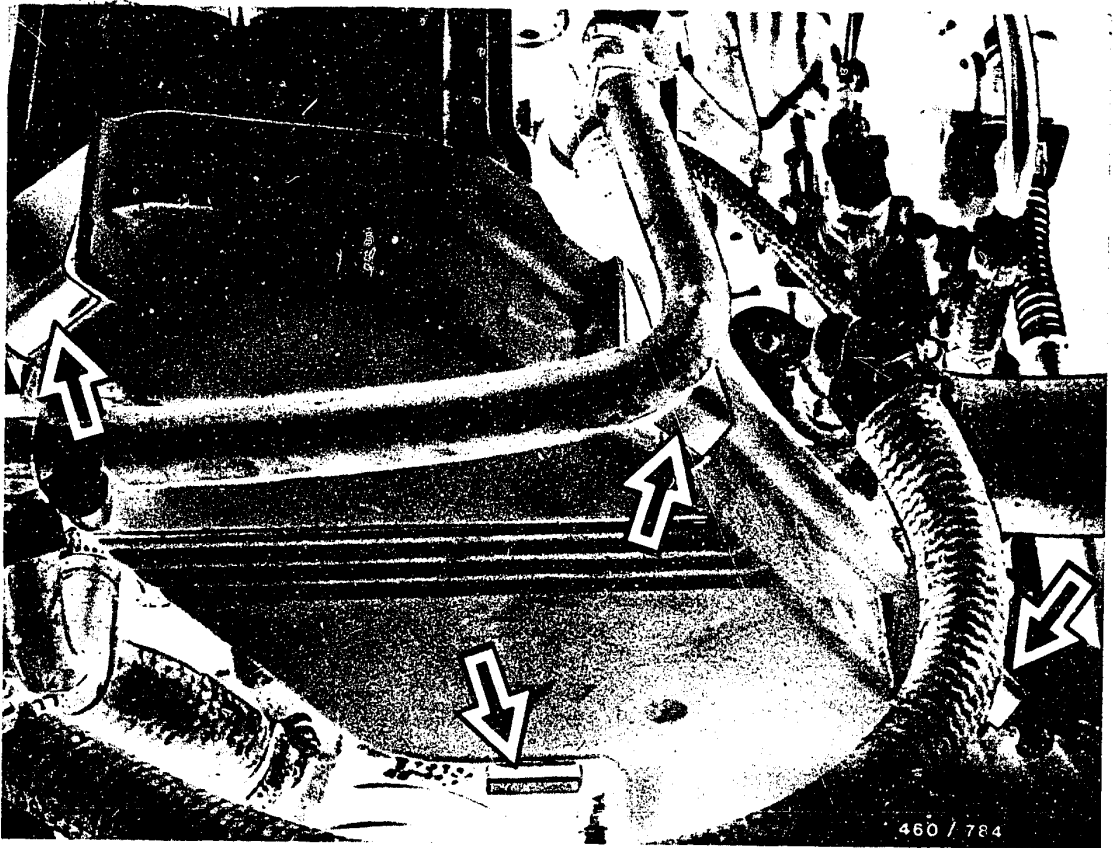
<u>Location of noise</u>	<u>Possible trouble</u>
Intake manifold (remove air filter)	Intake valve
Exhaust manifold	Exhaust valve
Oil filler neck on engine	Pistons, piston rings
Cooling water filler neck (air bubbles)	Cylinder head gasket

In order to trace the trouble even more accurately, fill approximately 2-3 cm<sup>3</sup> of engine oil into the cylinder. Repeat test.

If there is a clear decrease in compression loss during this test, then the fault lies with the piston or with the piston rings.

New engines which have not yet been run in (less than 5,000 km) may show higher compression losses than after the running-in period.





#### 24. Remove fuel-injection pump

Disconnect negative cable from battery.

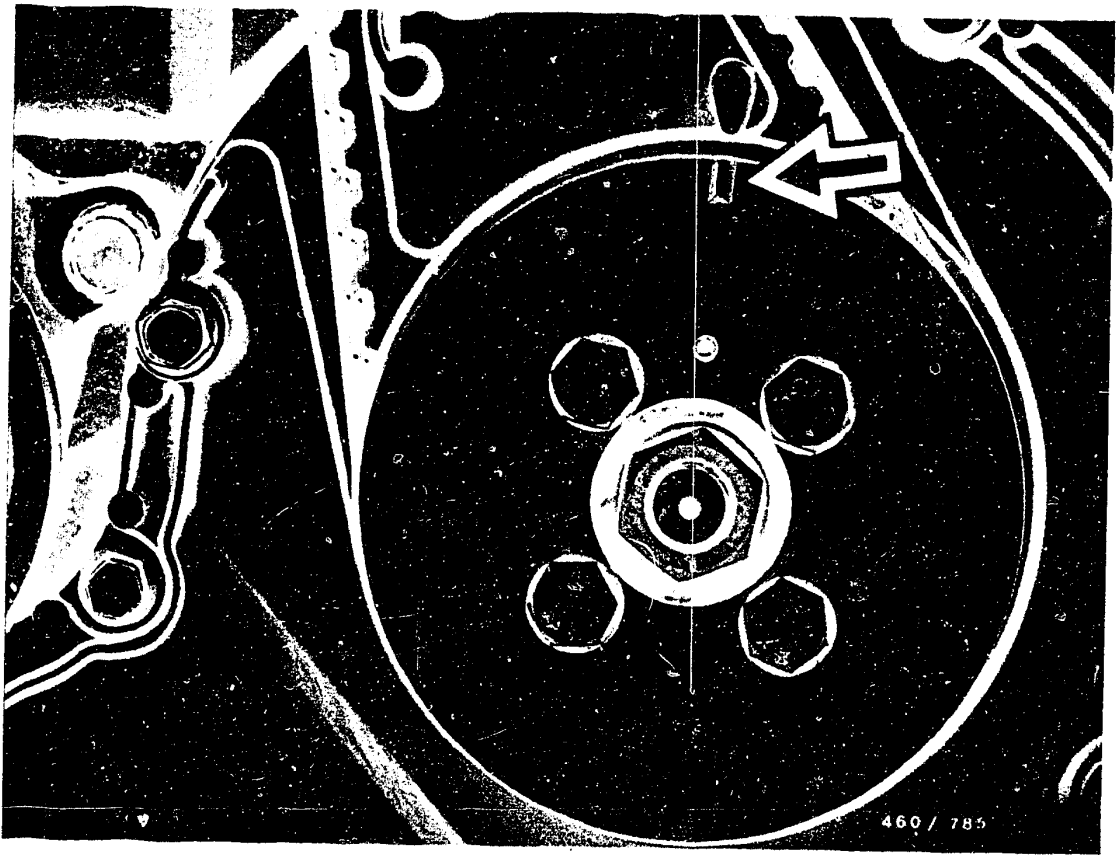
Loosen spring clips (arrows).  
Remove toothed-belt cover.

**D21**

Remove fuel-injection pump

Ford Escort D, Fiesta D, Orion D



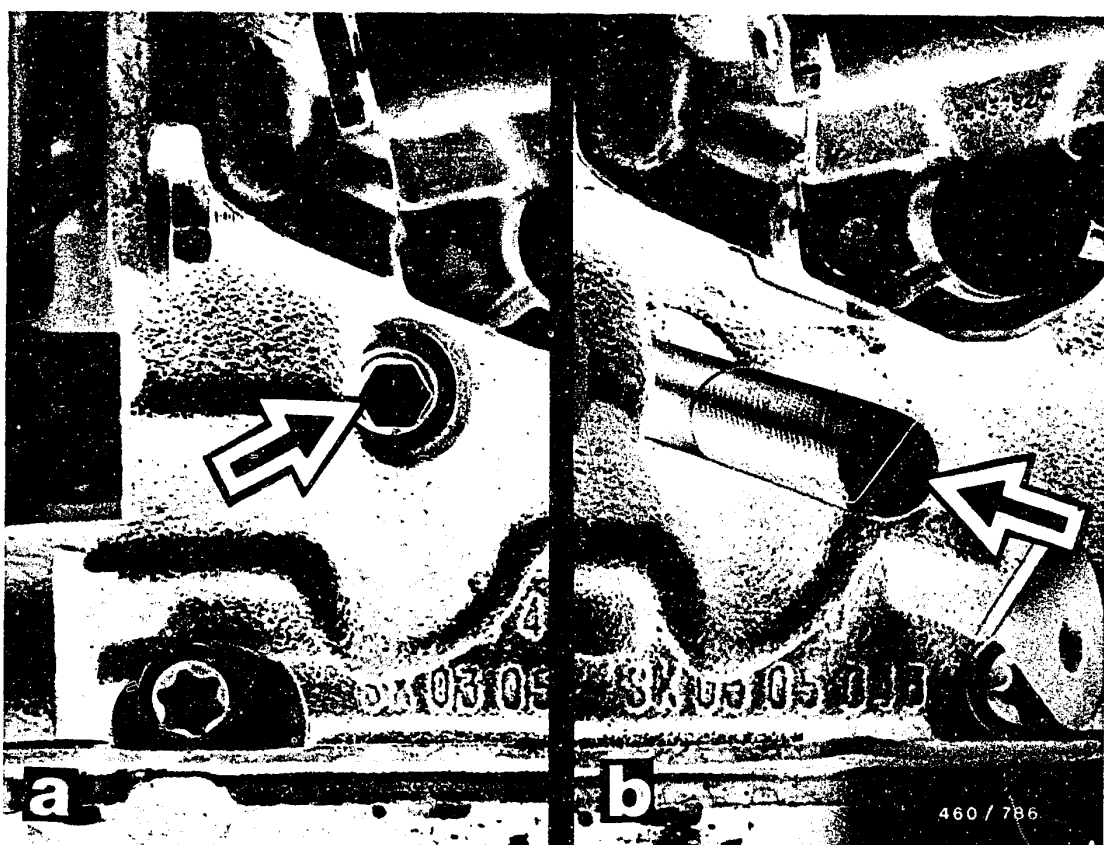


Turn crankshaft in engine direction of rotation until TDC mark (cylinder 1) on toothed-belt pulley of injection pump aligns with mark on end cover (arrow).

Note:

Do not remove toothed belt.





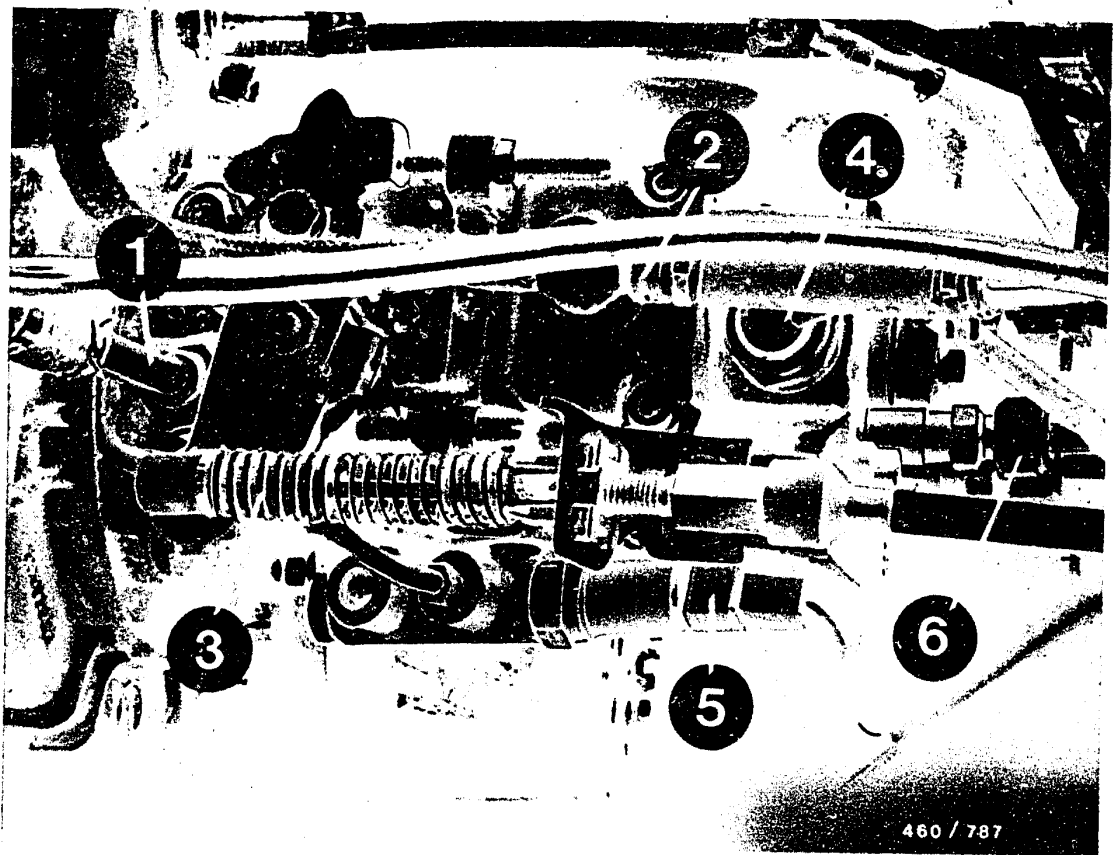
Remove screw plug (arrow, Fig. a).

Note:

Screw plug is situated on recess of engine block, below the alternator bracket.

Screw in setting mandrel (arrow, Fig. b).



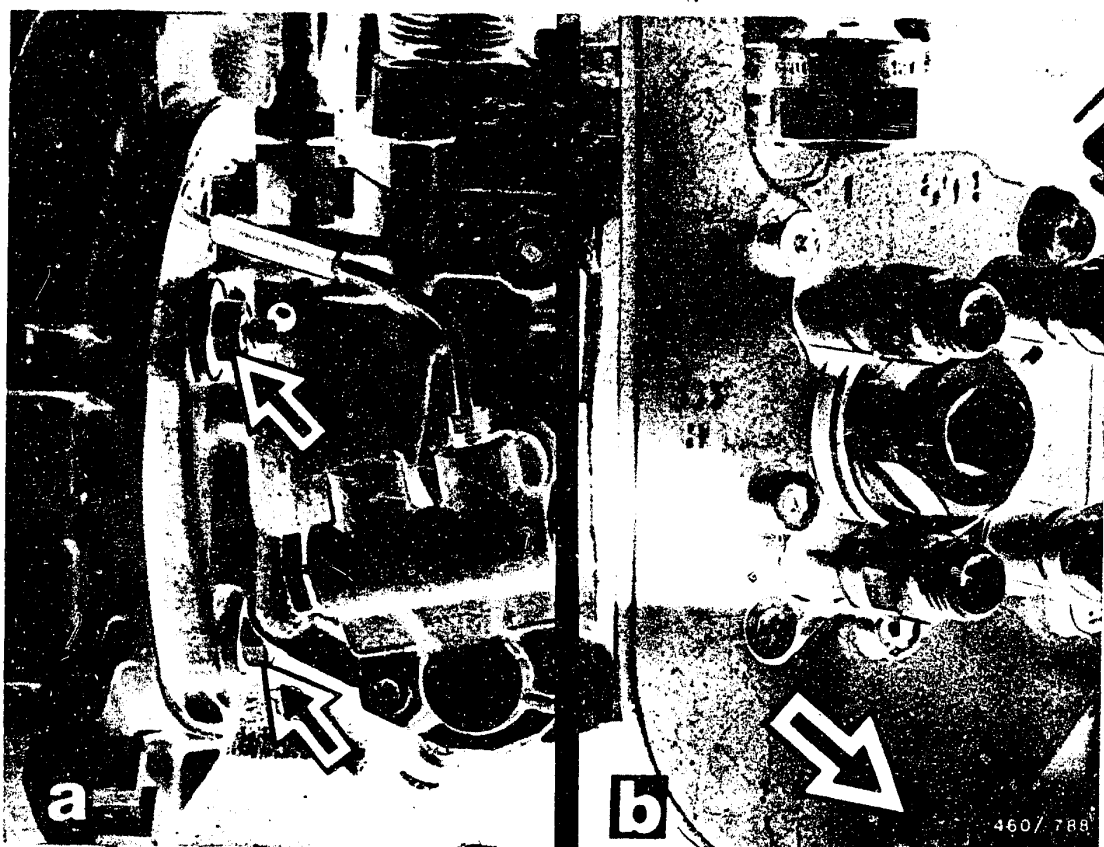


Unscrew fuel inlet line (1) and return line (2) from injection pump.

Disconnect accelerator bowden cable (3) from injection-pump lever. Remove cable for electrical shutoff device (4) and hydraulic KSB (cold-start accelerator) (5).

Loosen injection lines (6) with open box wrench KDEP 1115 (prevent delivery-valve holders from coming loose by holding with a wrench).





Remove fastening screws and nuts of injection pump (arrows, Figs. a and b).

Note:

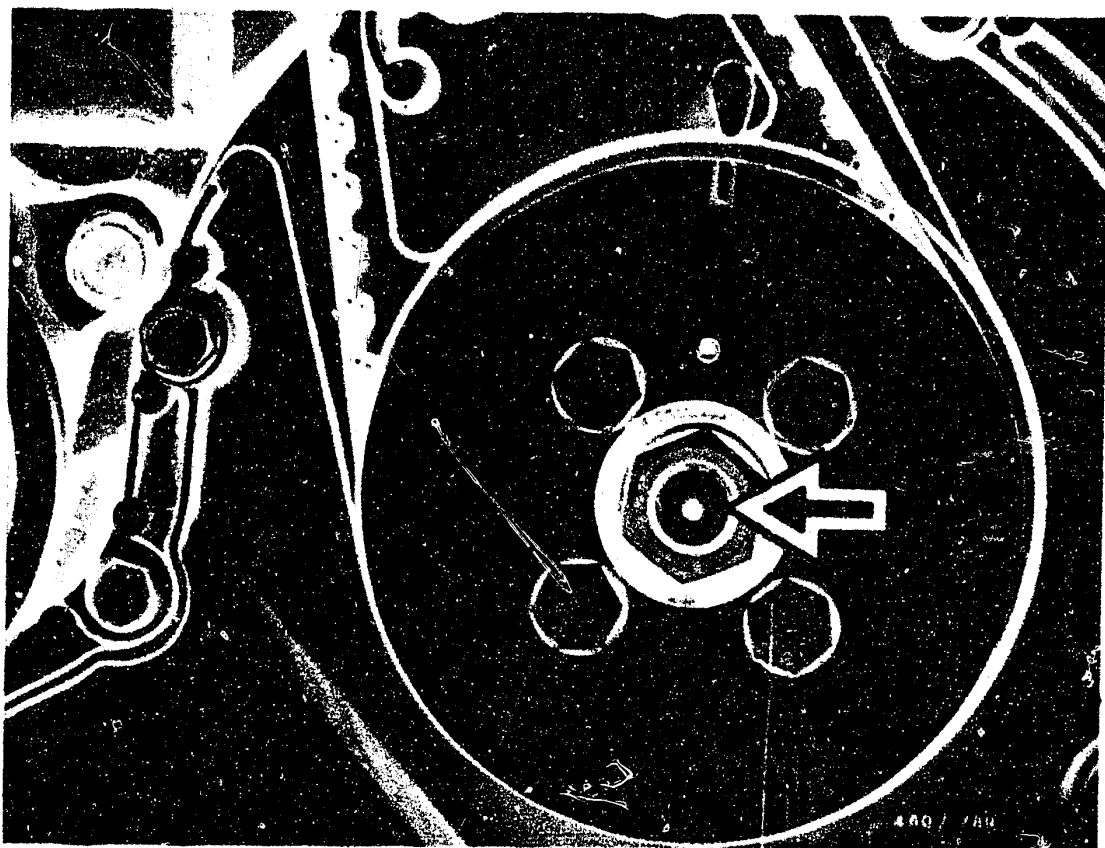
Never loosen the hexagon-socket-head cap screws (Fig. b); are fastening screws of hydraulic head.

**E1**

Remove fuel-injection pump

Ford Escort D, Fiesta D, Orion D





Remove fastening nut of injection-pump toothed-belt pulley (arrow).

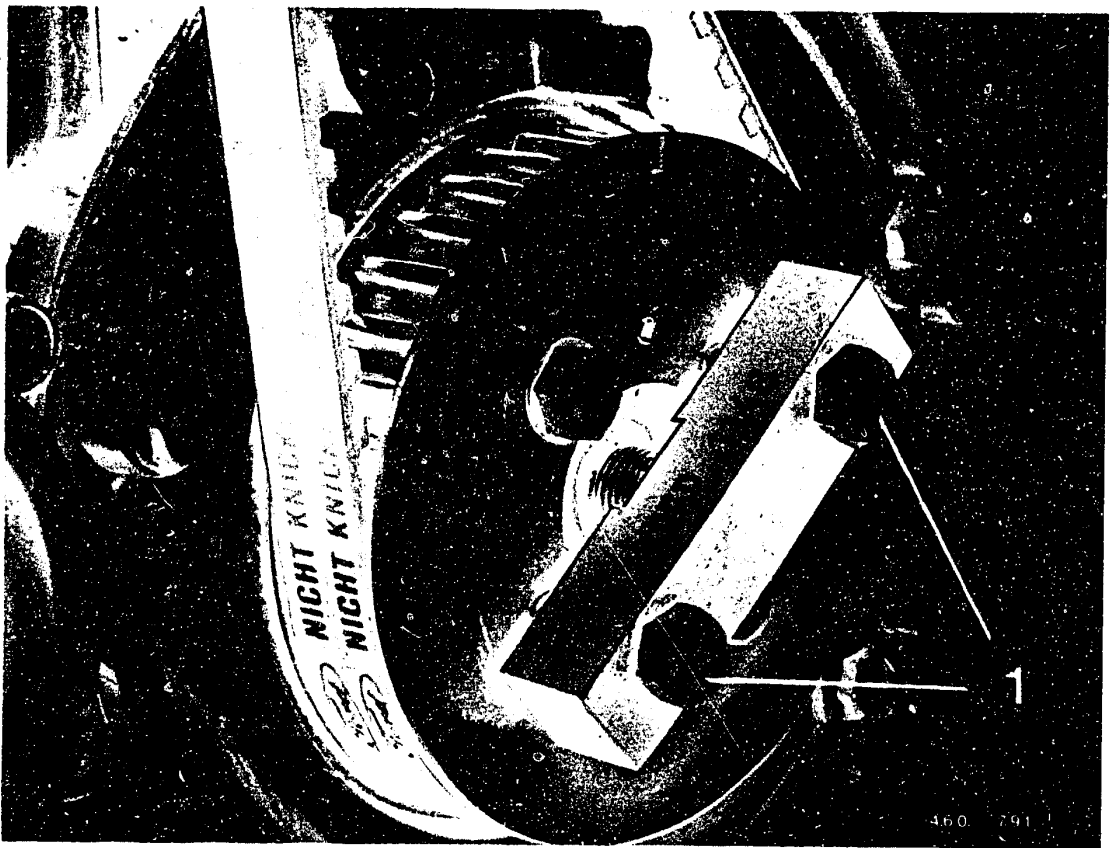
**E2**

Remove fuel-injection pump

Ford Escort D, Fiesta D, Orion D







Remove fastening screws (1) of injection-pump toothed-belt pulley.  
Mount puller KDEP 1148.

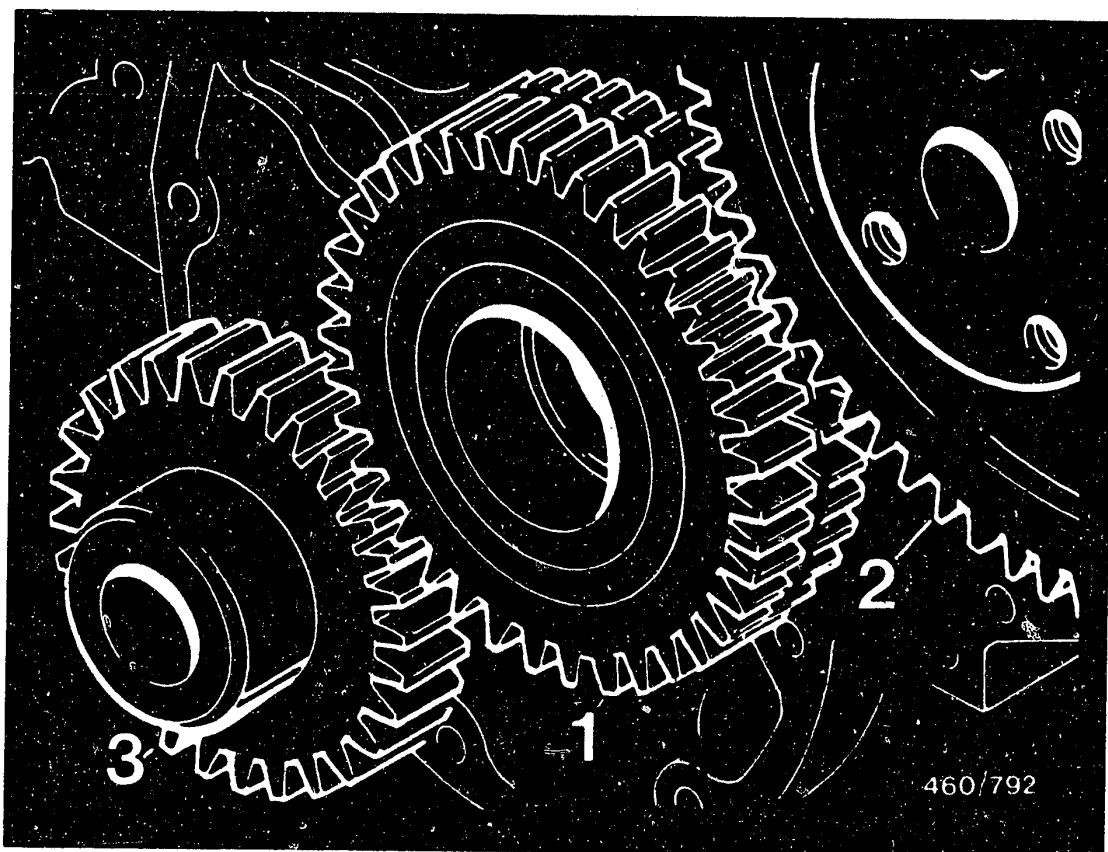
Force injection pump out of injection-pump toothed-belt pulley by screwing the two fastening screws (1) in again.

**E3**

Remove fuel-injection pump

Ford Escort D, Fiesta D, Orion D





- 1 = Intermediate gear
- 2 = Injection-pump toothed-belt pulley
- 3 = Crankshaft gear

#### 25. Install fuel-injection pump

When installing the injection pump, do not loosen or remove the toothed belt since otherwise the two-part intermediate gear (1) will no longer be in engagement with the injection-pump toothed-belt pulley (2).

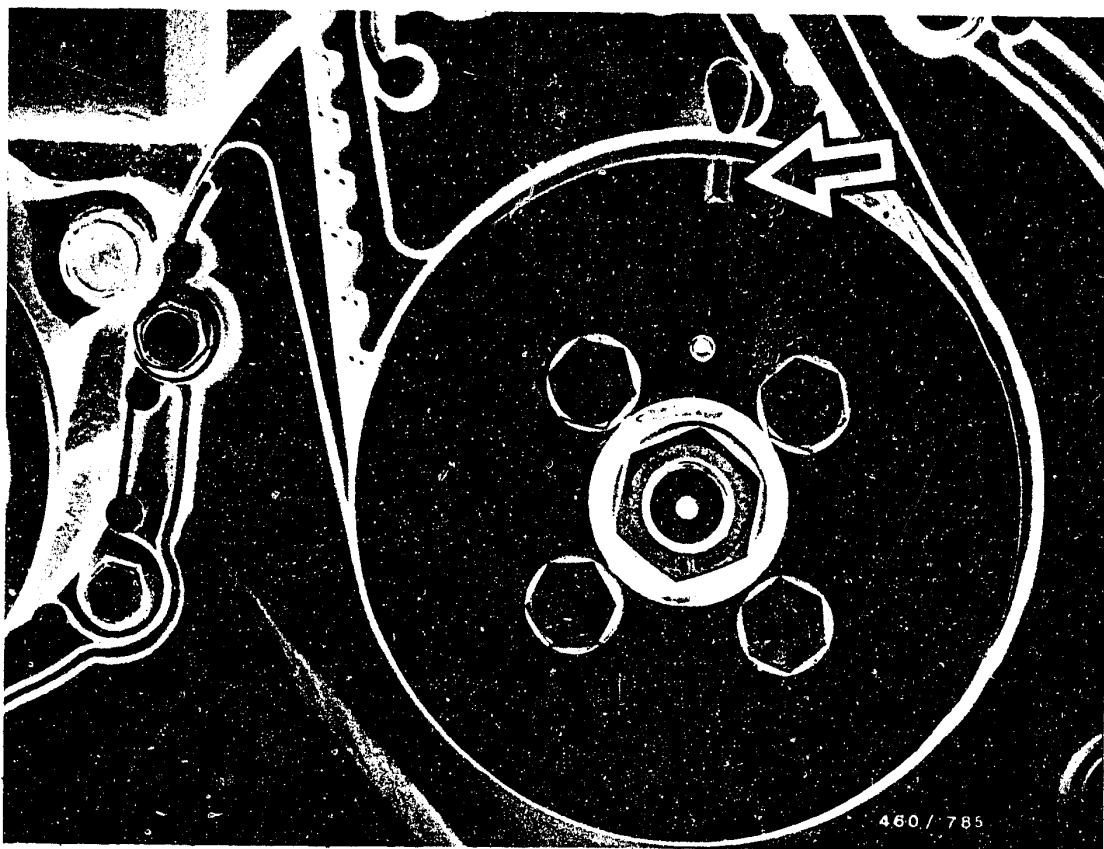
The intermediate gear is a two-part gear wheel. Under spring tension, it compensates for any play in the gearwheels, thus reducing wear and noise level.

**E4**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D



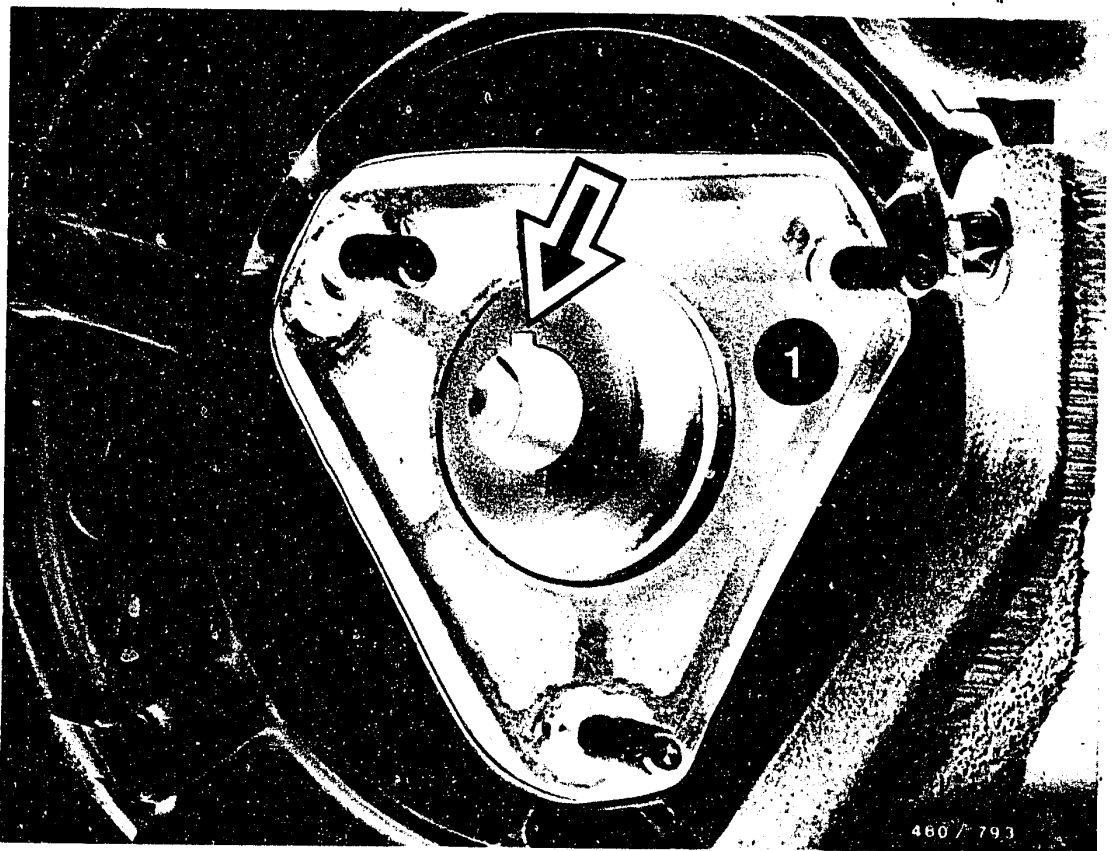


Check whether TDC mark on injection-pump toothed-belt pulley is in alignment with mark on end cover (arrow).

**E5**

Install fuel-injection pump  
Ford Escort D, Fiesta D, Orion D





Place new seal on housing of injection-pump toothed-belt pulley.

Turn pump drive shaft until Woodruff key points toward end cover mark.

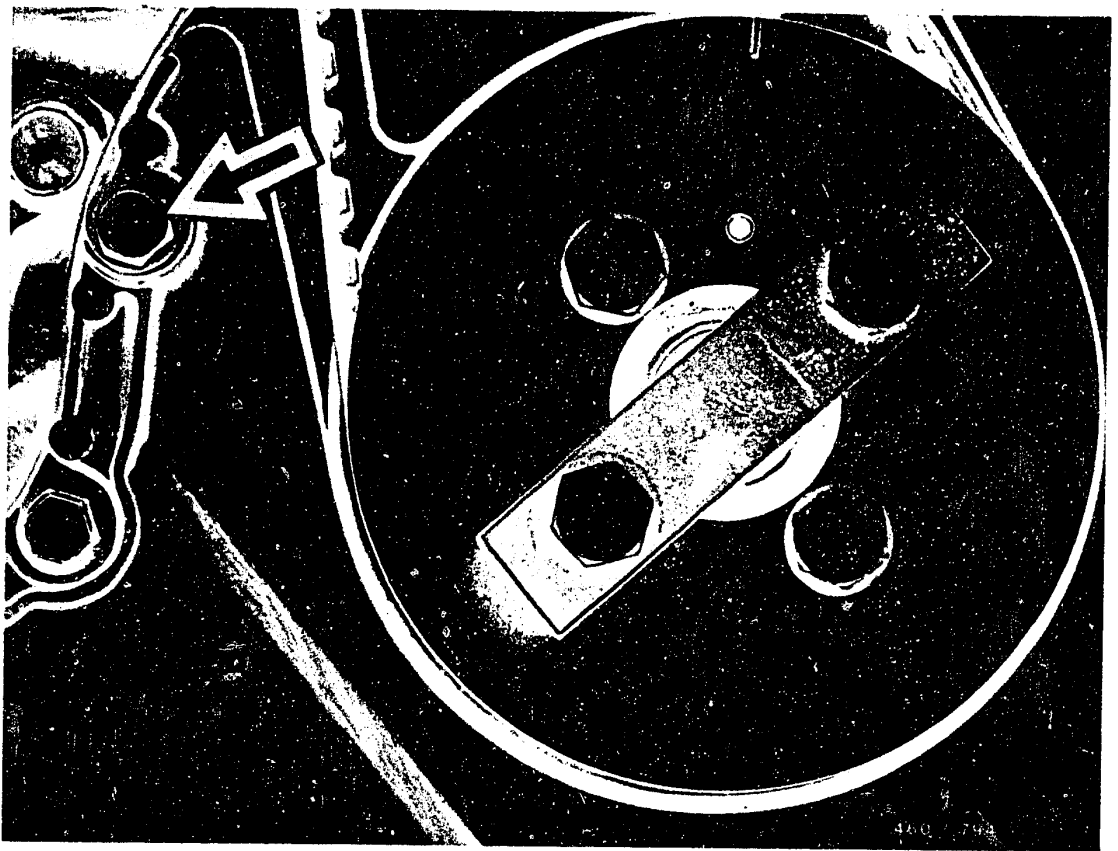
The Woodruff key aligns with the corresponding groove in the injection-pump toothed-belt pulley (arrow).

**E6**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D



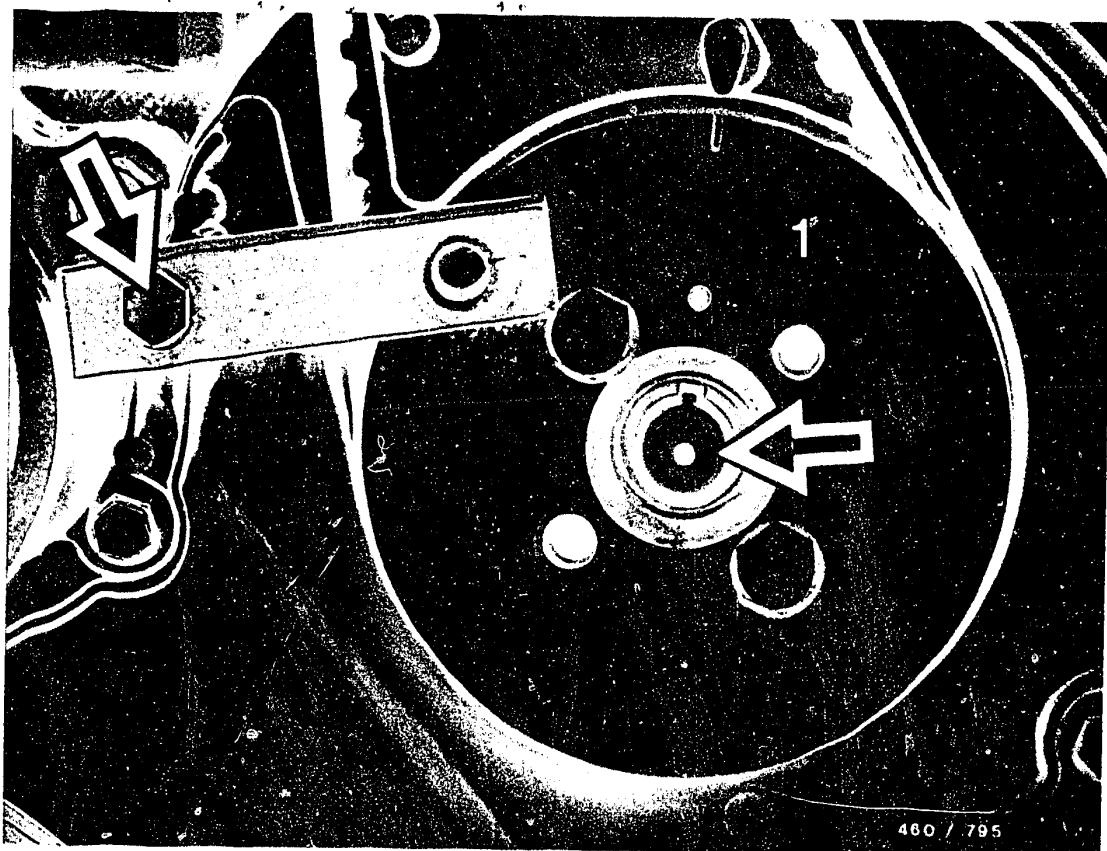


Remove fastening screw (arrow) on end cover.

**E7**

Install fuel-injection pump  
Ford Escort D, Fiesta D, Orion D





Hold injection-pump toothed-belt pulley with puller KDEP 1148 and appropriate fastening screw (M6 x 65) (see picture).

Only finger-tighten fastening screw.

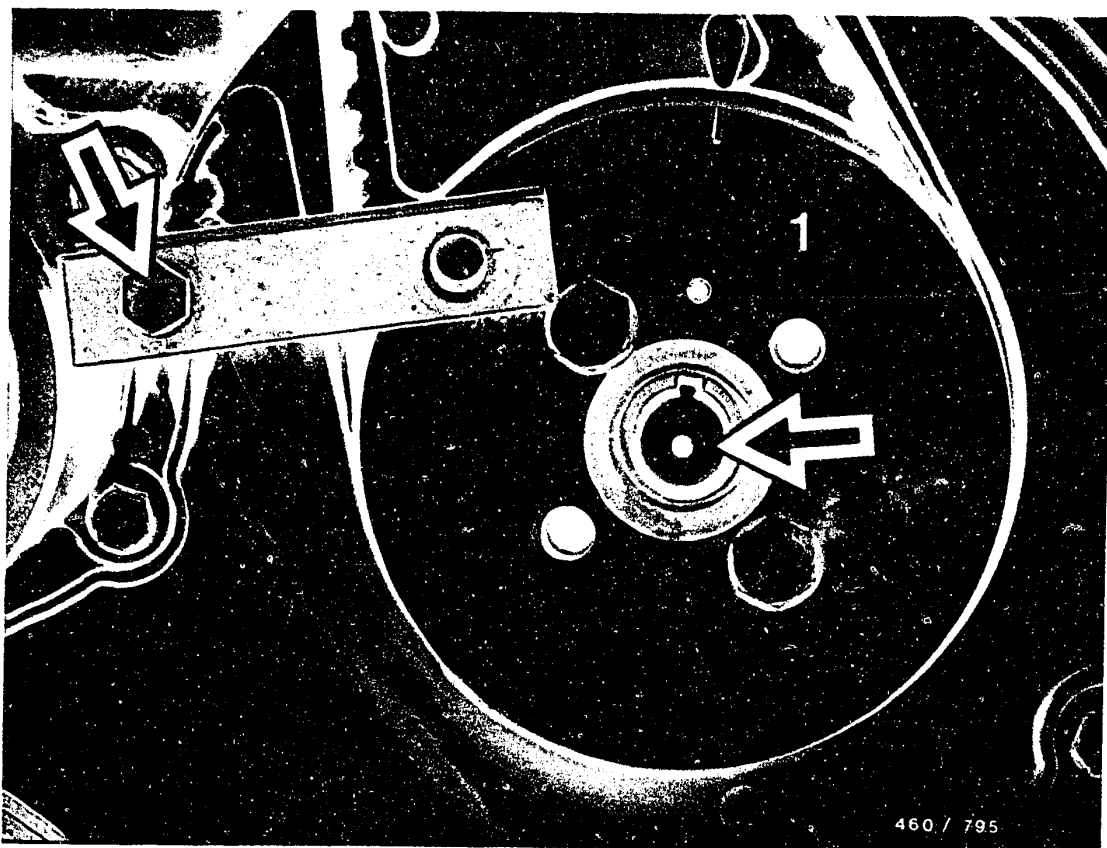
Note:

Be sure to hold injection-pump gear so that the spring-loaded side of the intermediate gear remains in engagement with the injection-pump toothed-belt pulley.

**E8**

Install fuel-injection pump  
Ford Escort D, Fiesta D, Orion D





Carefully introduce injection pump into hole of injection-pump gear. Make sure that Woodruff key is correctly seated in groove of injection-pump gear (arrow).

Note:

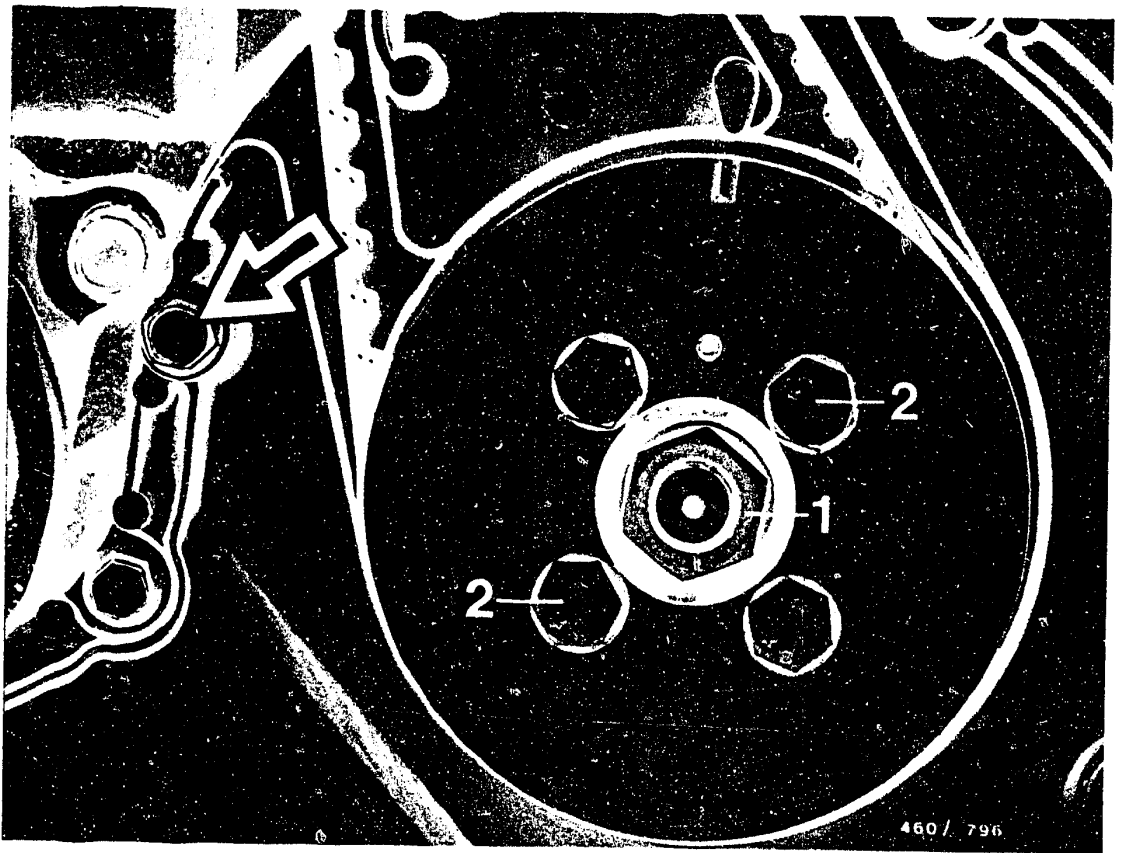
If the Woodruff key drops into the timing case, it may be necessary to remove the engine.

**E9**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D





Screw on fastening nut (1) of toothed-belt pulley and tighten to 18 - 22 Nm.

Remove puller KDEP 1148.

Re-mount end cover fastening screw (arrow).

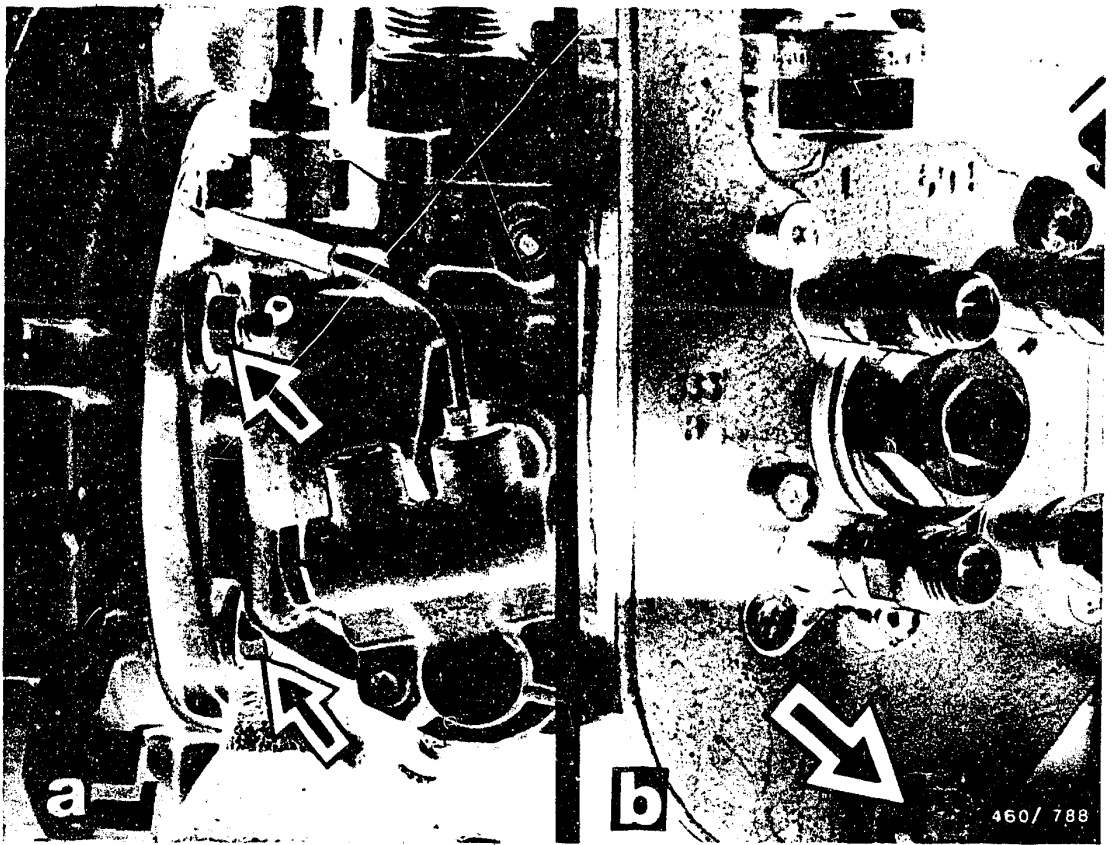
Position fastening screw (2) on injection-pump toothed-belt pulley and tighten to 18 - 22 Nm.

**E10**

Install fuel-injection pump  
Ford Escort D, Fiesta D, Orion D







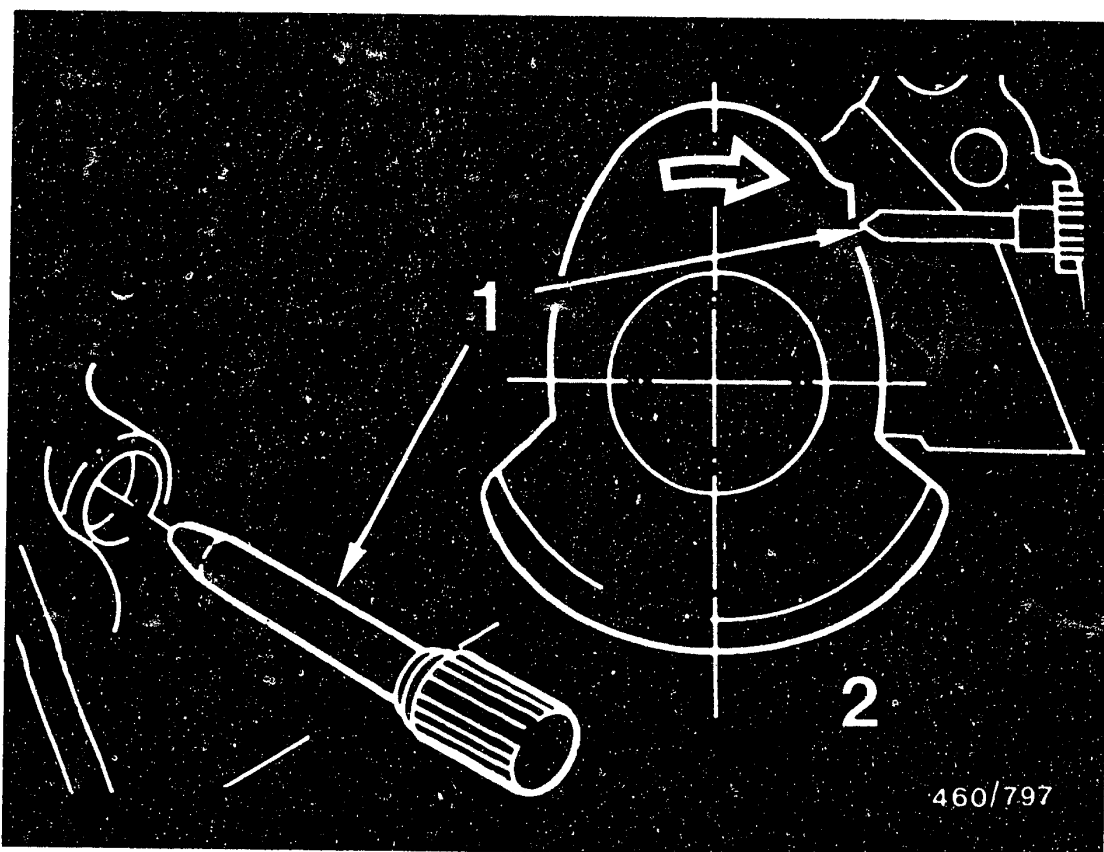
Position injection-pump fastening nuts and screw (arrows) and finger-tighten.

**E11**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D



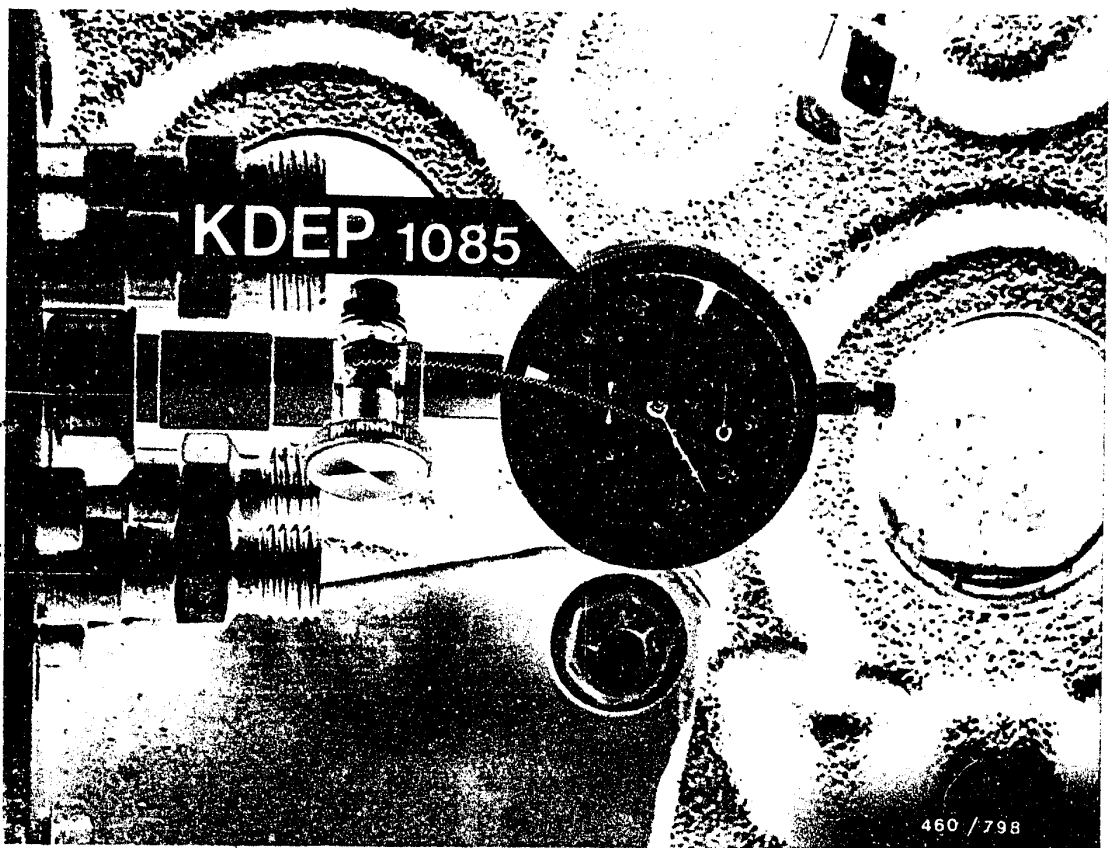


- 1 = Setting mandrel KDEP 1149  
2 = Crankshaft web

Slowly turn crankshaft in engine direction of rotation until crankshaft web is up against setting mandrel.

Pump drive gear thereby moves to the right.





Unscrew bleeder screw from central screw plug (triangular plug) of hydraulic head.

Mount measuring tool KDEP 1085 with dial indicator in tapped hole.

Preload dial indicator by approx. 2.5 mm.

Slowly turn crankshaft against engine direction of rotation until pointer of dial indicator no longer moves.

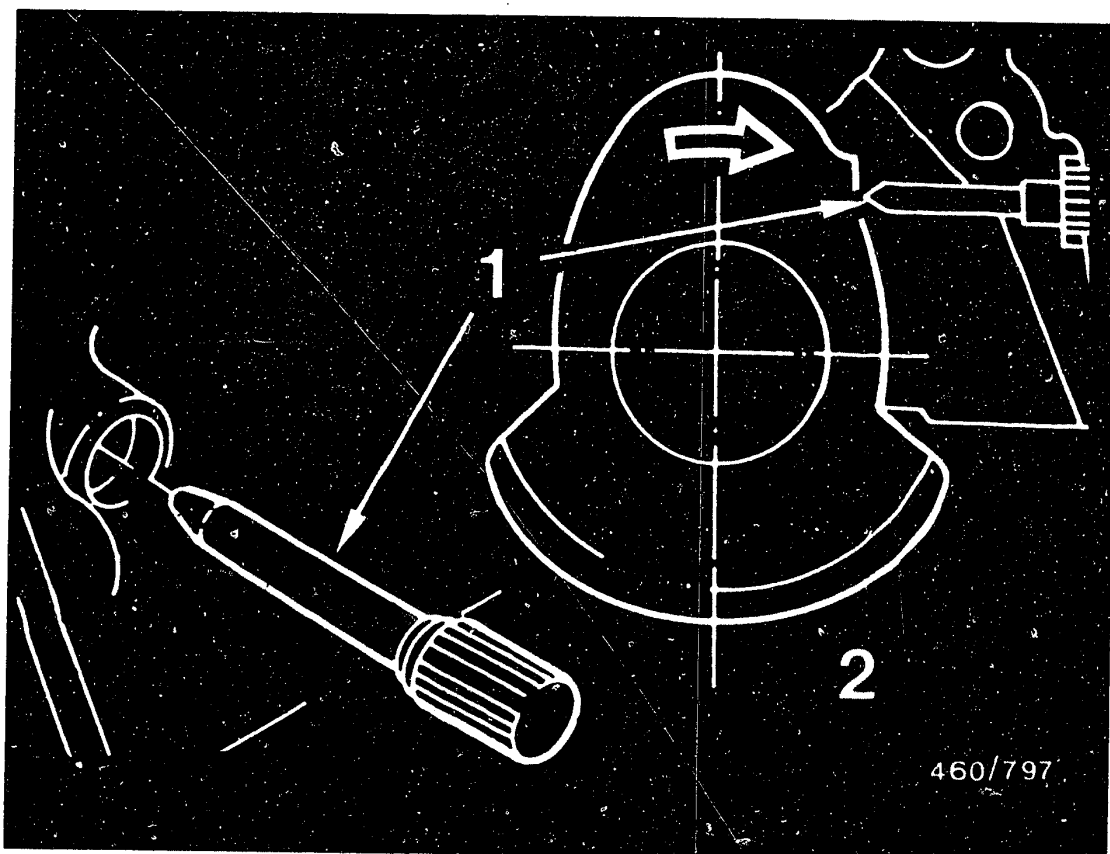
Preload dial indicator by approx. 1.0 mm and set to "0".

**E13**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D





1 = Setting mandrel KDEP 1149

2 = Crankshaft web

Slowly turn crankshaft in engine direction of rotation until crankshaft web is up against setting mandrel.

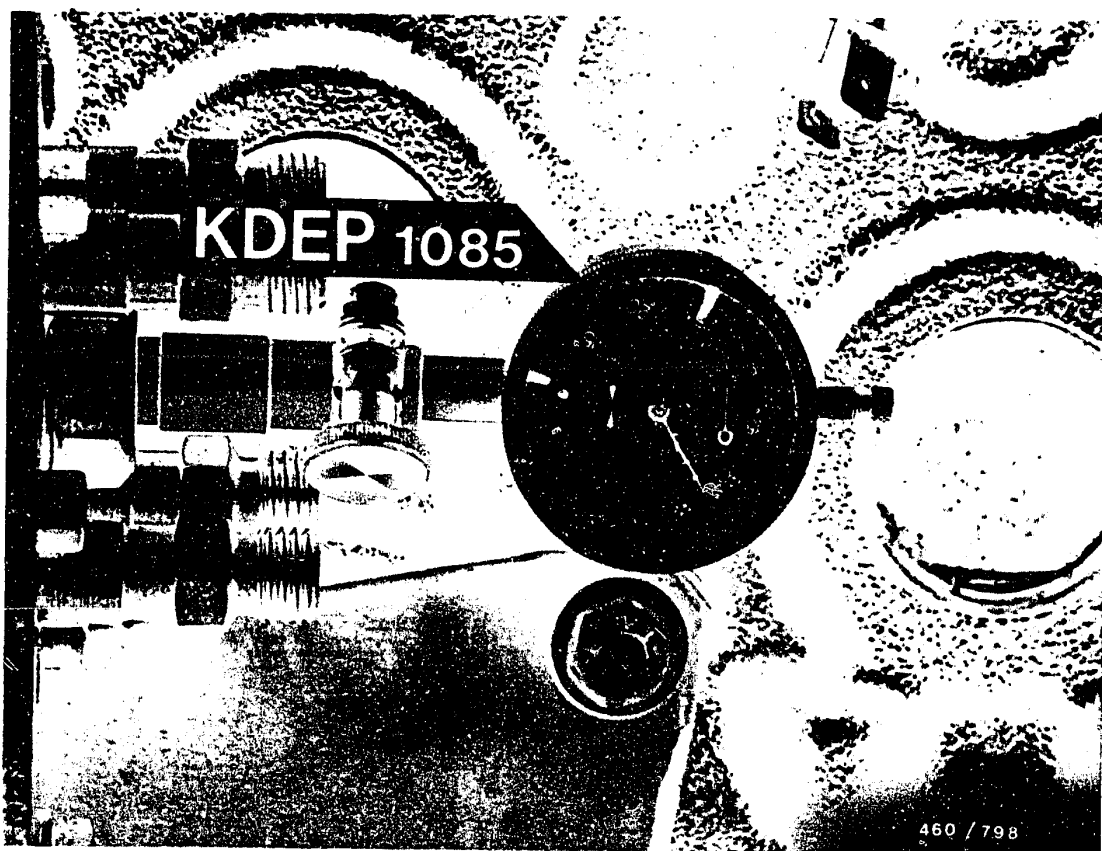
In this position, the dial indicator on the injection pump must indicate a plunger stroke of 0.91 - 0.93 mm ABDC.

**E14**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D





If a correction is necessary, loosen injection-pump fastening screws.

Pivot injection pump until a stroke of 0.92 mm ABDC is reached.

Tighten injection-pump fastening screws to 15 - 25 Nm.

**E15**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D



### Test injection timing

Turn crankshaft against engine direction of rotation.  
Check zero position of dial indicator.

Turn crankshaft slowly in direction of rotation until it is up against the setting mandrel.

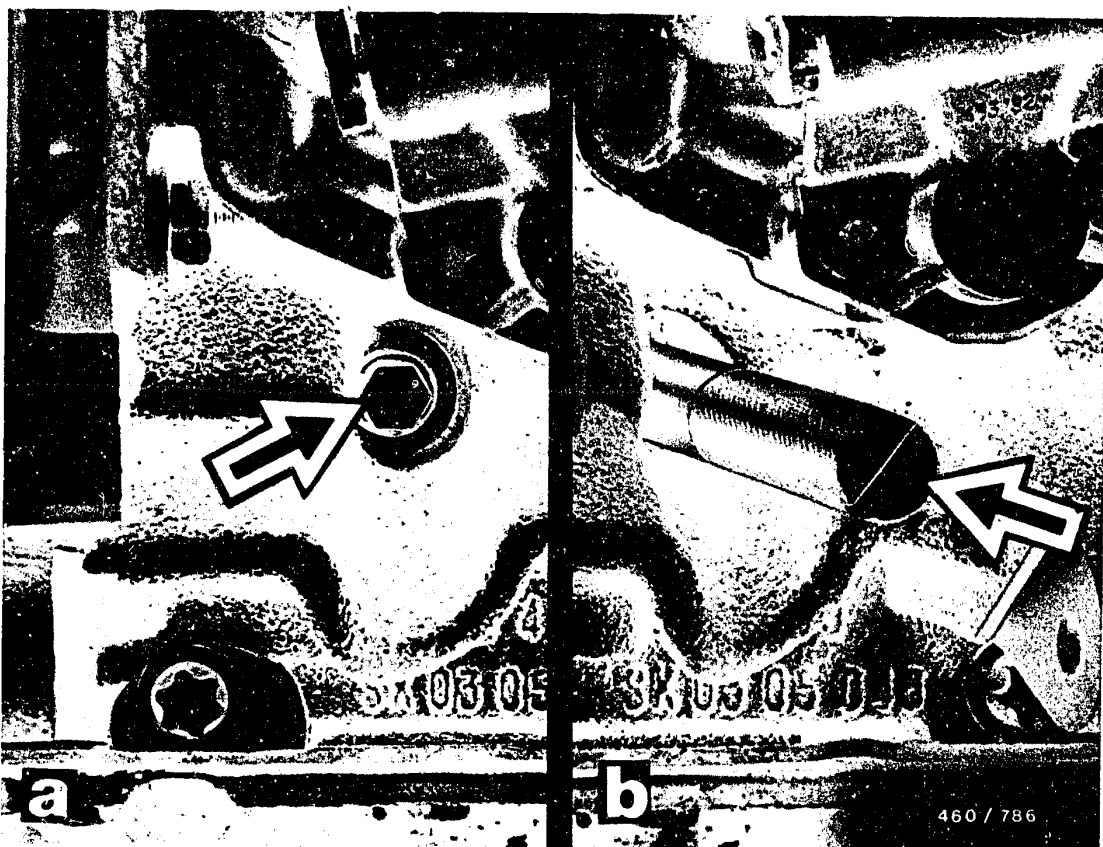
In this position, the dial indicator must indicate a pump plunger stroke of 0.91 - 0.93 mm ABDC.

Remove measuring tool KDEP 1085 with dial indicator and holder.

Mount bleeder screw on injection pump with new seal ring.

Tighten injection lines with open box wrench KDEP 1115, making sure that the delivery-valve holders do not turn by holding with a wrench.



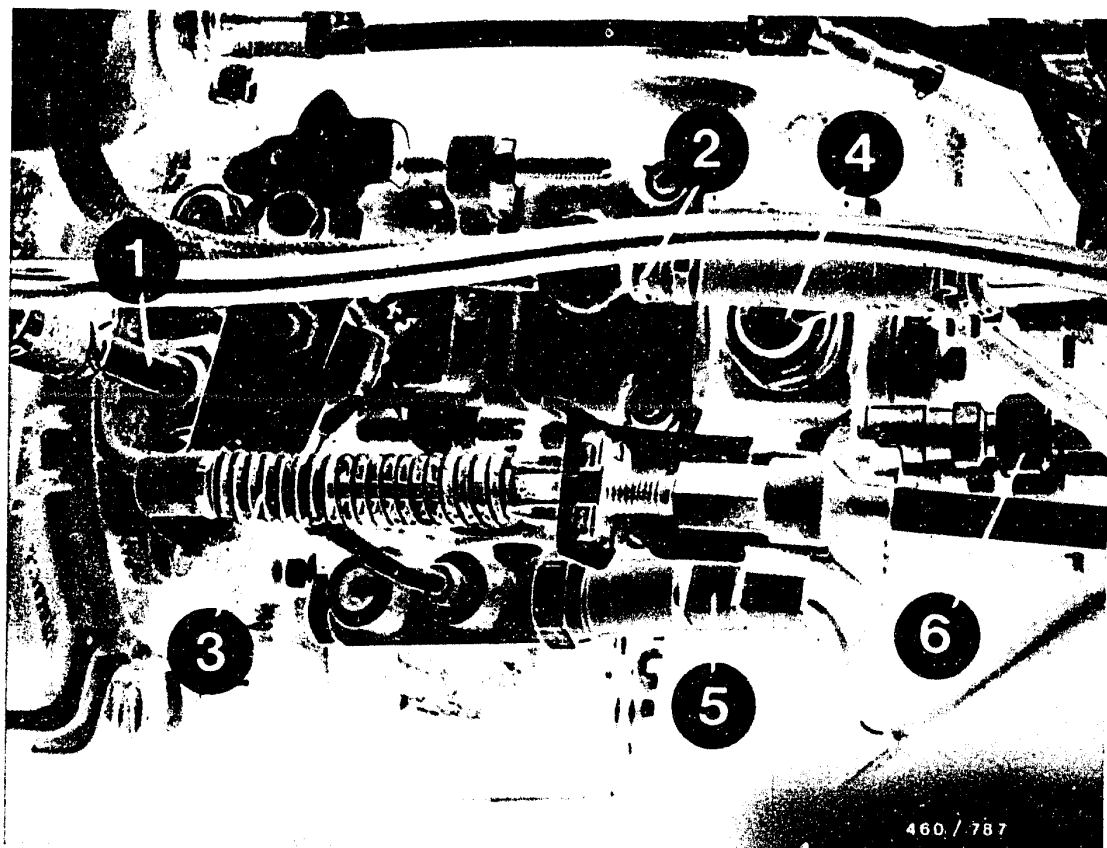


Remove setting mandrel (arrow, Fig. b).  
Mount screw plug (arrow, Fig. a).

**E17**

Install fuel-injection pump  
Ford Escort D, Fiesta D, Orion D





Mount fuel inlet line (1) and return line (2). Mount accelerator bowden cable (3) on speed-control lever. Connect cable for electrical shutoff device (4) and hydraulic KSB (cold-start accelerator) (5).

Note:

The inlet-union screw of the fuel return line is provided with restriction bores and the head of the screw is marked "out".

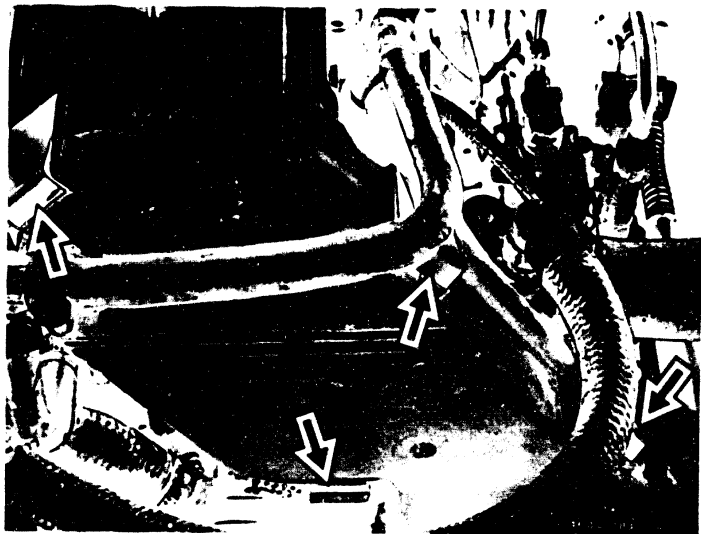
**E18**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D







Mount toothed-belt cover and secure with spring clips (arrows).

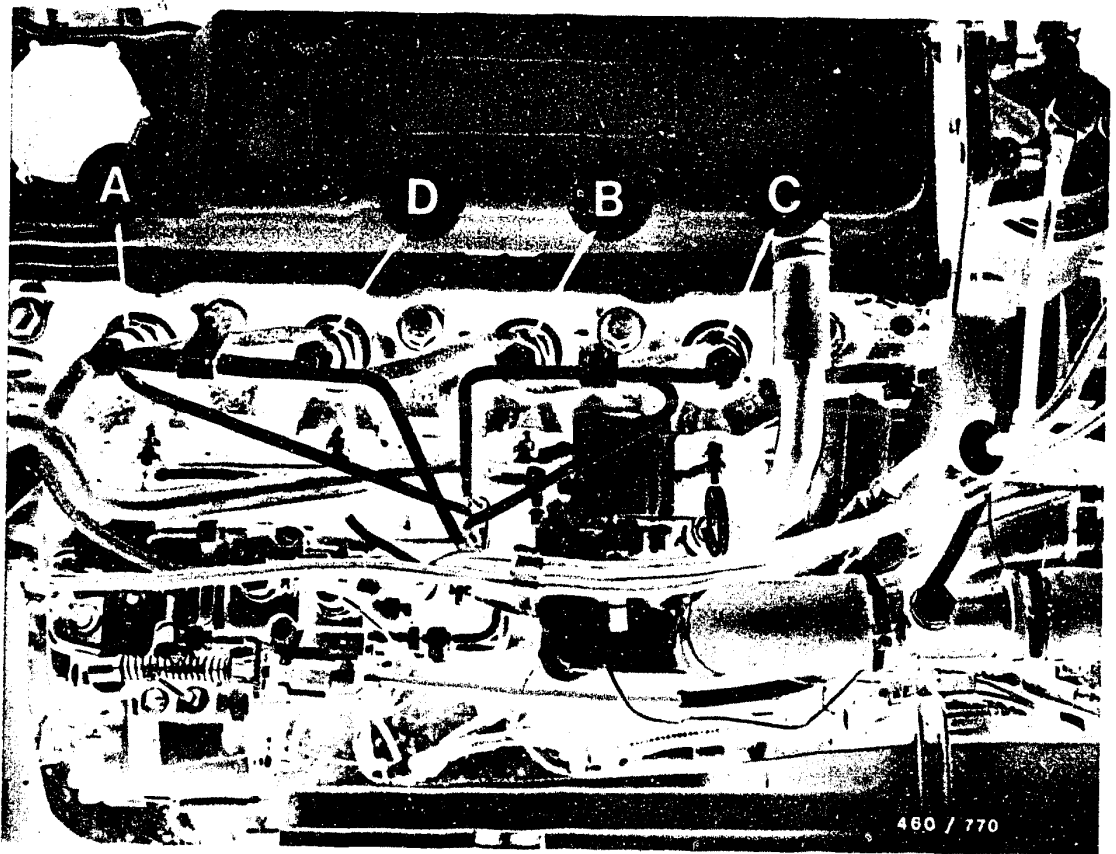
Connect negative cable to battery.

**E19**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D





### 25.1 Bleed fuel system

Loosen union nuts of fuel-injection tubing A - D on nozzle-holder assemblies.

Operate starting motor without preheating until fuel escapes from the union nuts of the nozzle-holder assemblies. Tighten union nuts to 15 - 25 Nm.

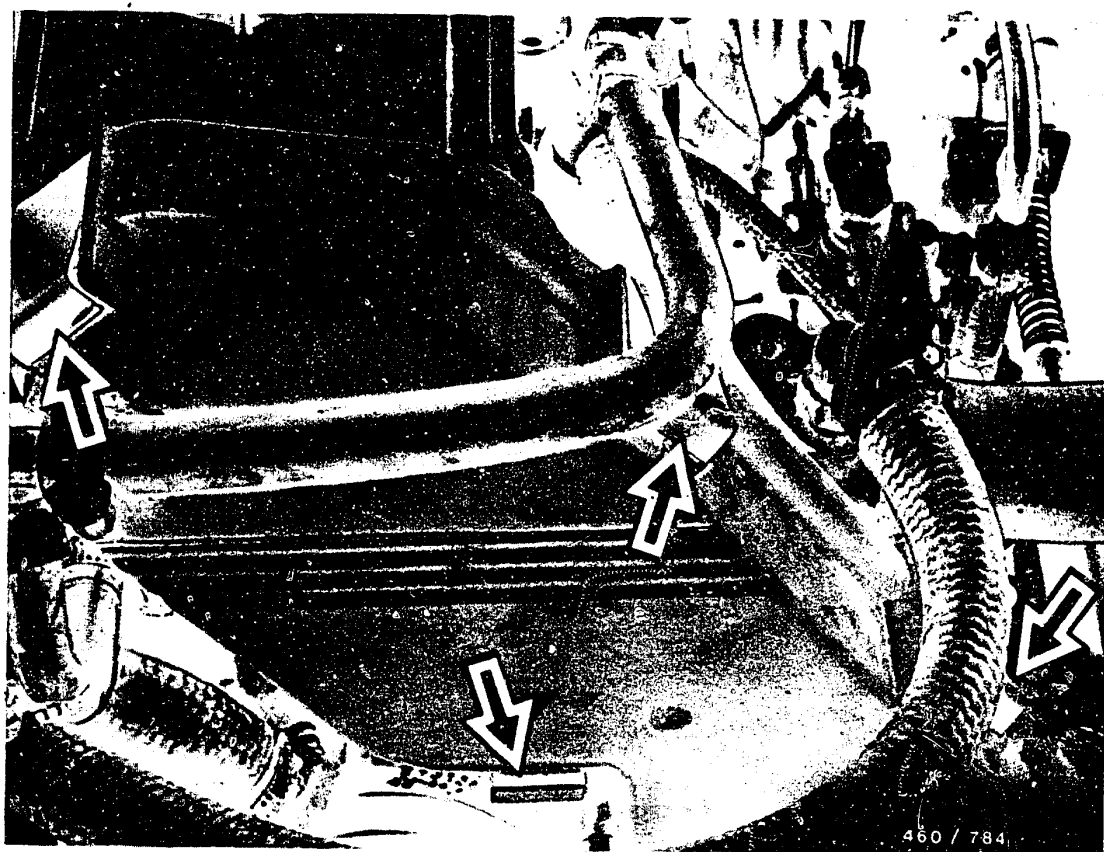
Operate starting motor until engine starts.

**E20**

Install fuel-injection pump

Ford Escort D, Fiesta D, Orion D





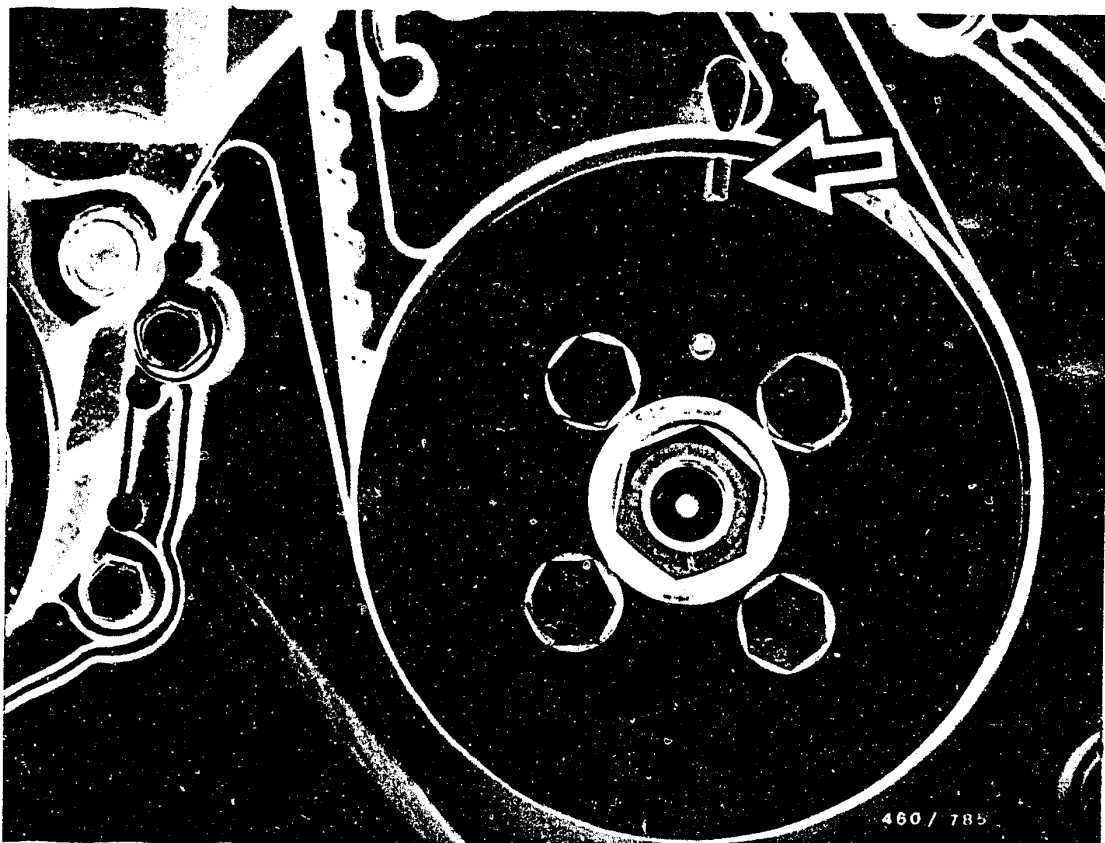
## 26. Replace toothed belt

Disconnect negative cable from battery.

Loosen spring clips (arrows).

Remove toothed-belt cover and cylinder-head cover.





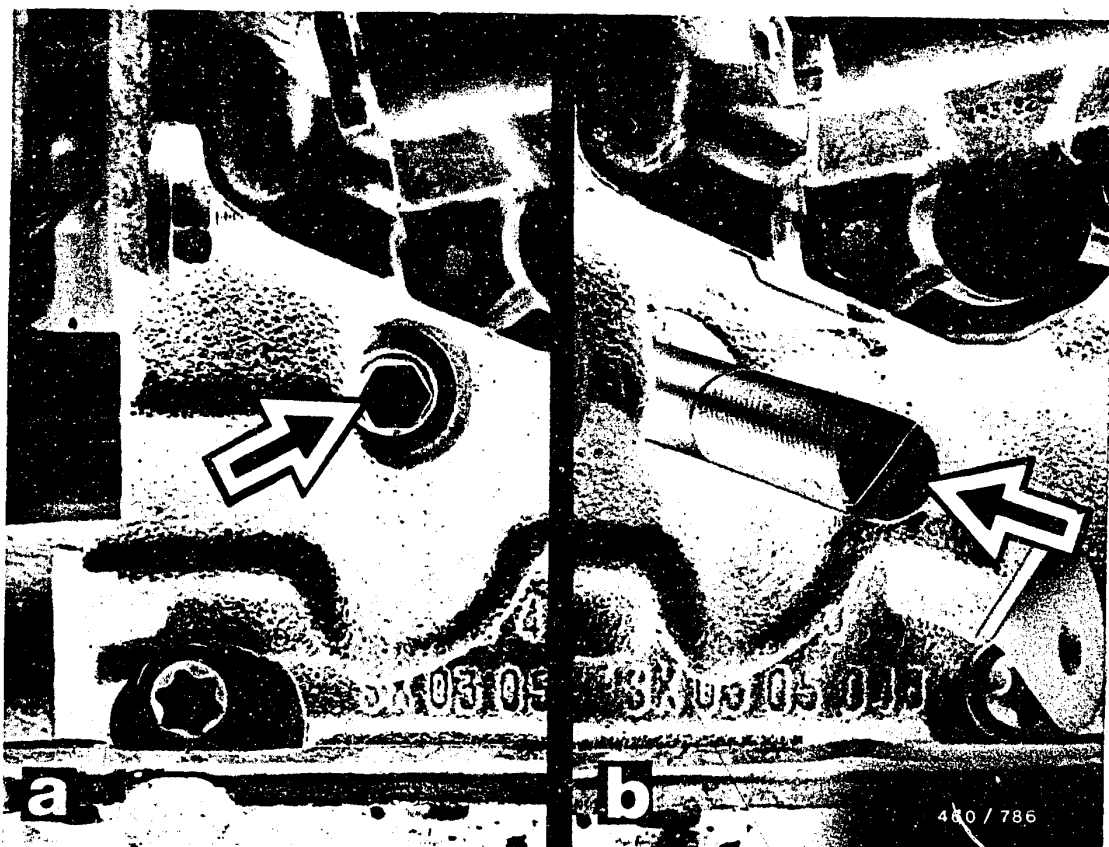
Turn crankshaft in engine direction of rotation until TDC mark (cylinder 1) on toothed-belt pulley of injection pump aligns with mark on end cover (arrow).

**E22**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D





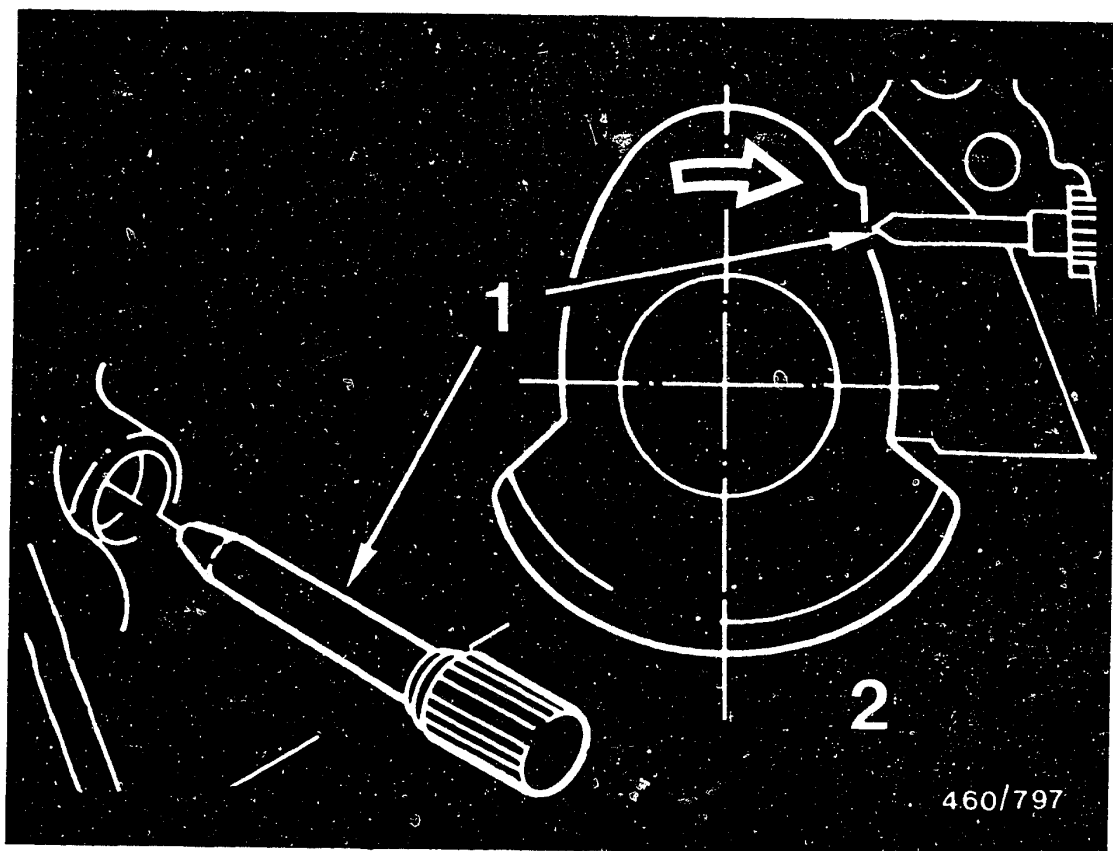
Remove screw plug (arrow, Fig. a).

Note:

Screw plug is situated on recess of engine block, below the alternator bracket.

Screw in setting mandrel (arrow, Fig. b).





- 1 = Setting mandrel KDEP 1149  
2 = Crankshaft web

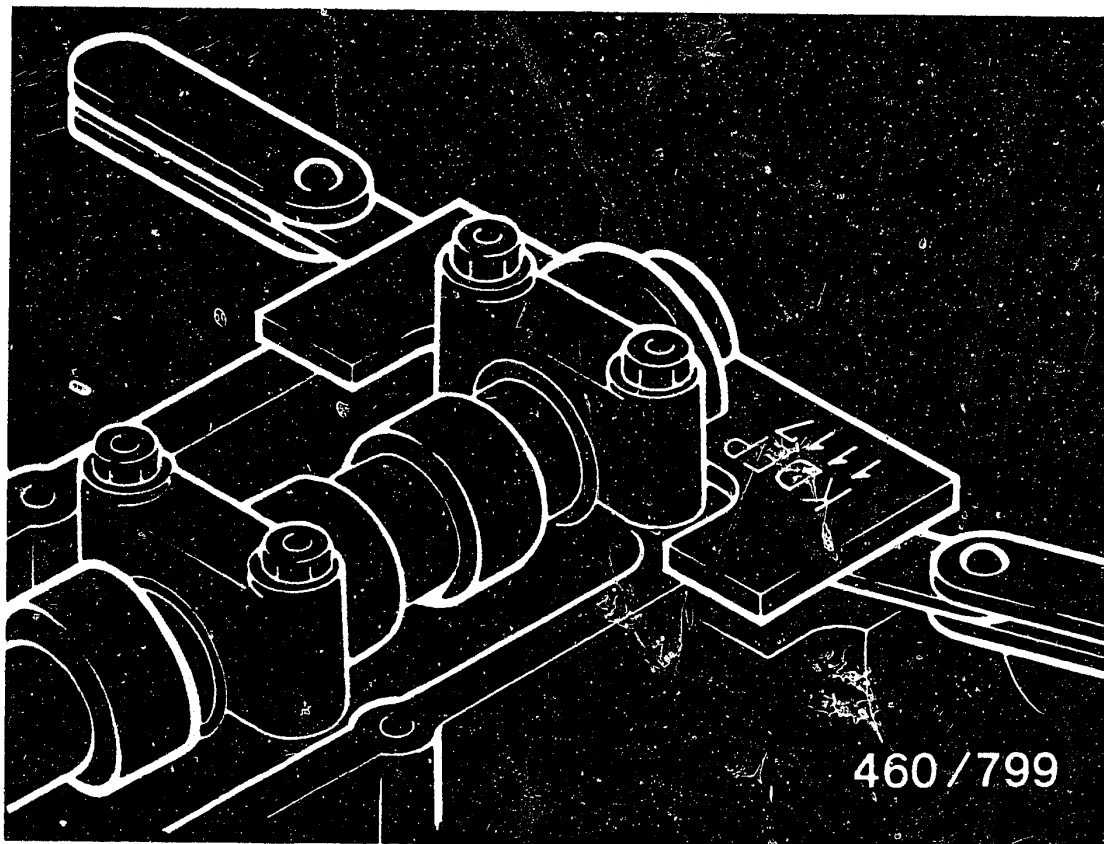
Slowly turn crankshaft in engine direction of rotation until crankshaft web is up against setting mandrel.

**E24**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D





Lock camshaft with setting rule KDEP 1117.

Center the setting rule as follows:

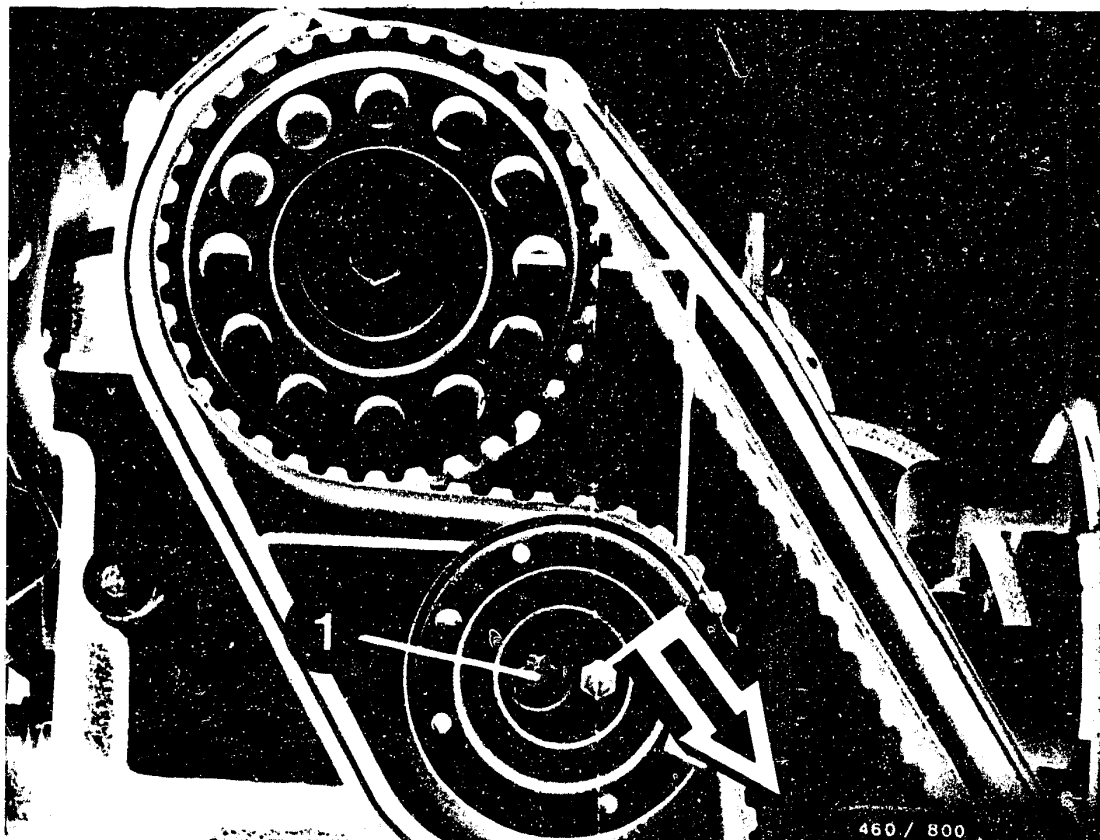
Slide two feeler gauges of equal thickness under each end of the setting rule (see picture) so that the groove in the camshaft aligns exactly with the surface of the cylinder head.

**F1**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D





Loosen fastening screw (1) on toothed-belt tensioning roller.

Force toothed-belt tensioning roller in a counterclockwise direction using a commercially available hexagon-socket-screw key (arrow). Remove toothed belt from camshaft gear and injection-pump toothed-belt pulley.

Note:

After removing the toothed belt, do not turn the crankshaft so as to avoid damage to pistons and valve gear. Loosen camshaft gear fastening screw. Using a plastic hammer, carefully loosen camshaft gear from tapered seat.

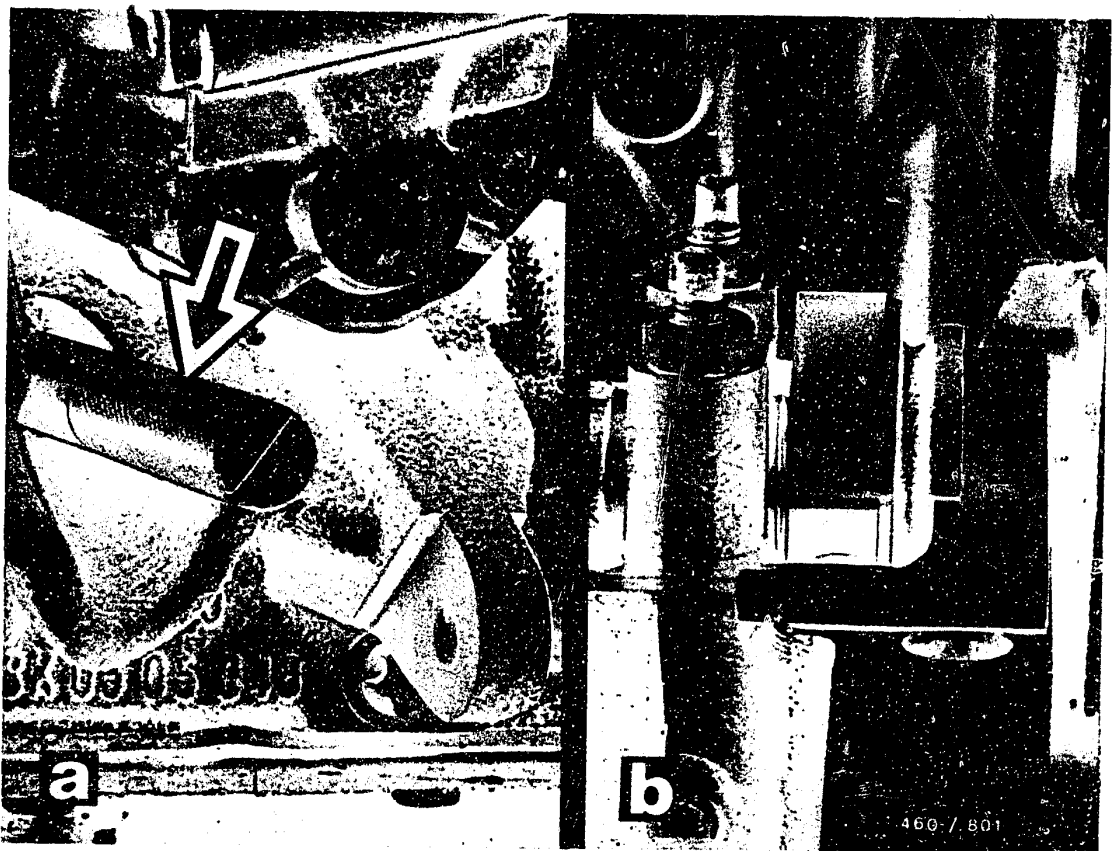
**F2**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D







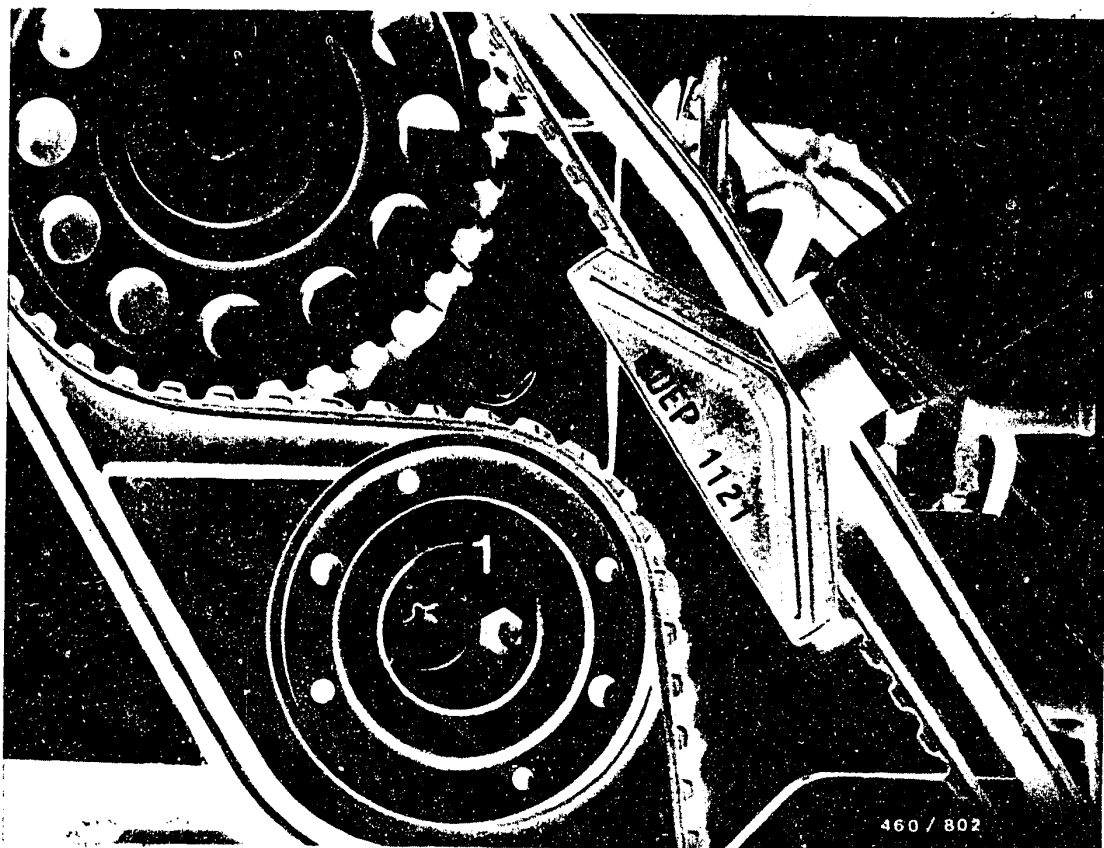
Before mounting the new toothed belt, check whether the crankshaft is up against the setting pin (Fig. a) and whether the camshaft is located by means of setting rule KDEP 1117 with feeler gauges (Fig. b).

**F3**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D





Put on toothed belt.

Turn tensioning roller (1) in a counterclockwise direction with hexagon-socket-screw key and tension toothed belt.

Test tension of toothed belt with belt tension tester KDEP 1121:

Mount belt tension tester as shown in picture.

Turn vernier sleeve until bottom edge of sleeve aligns with line mark on measuring tongue.

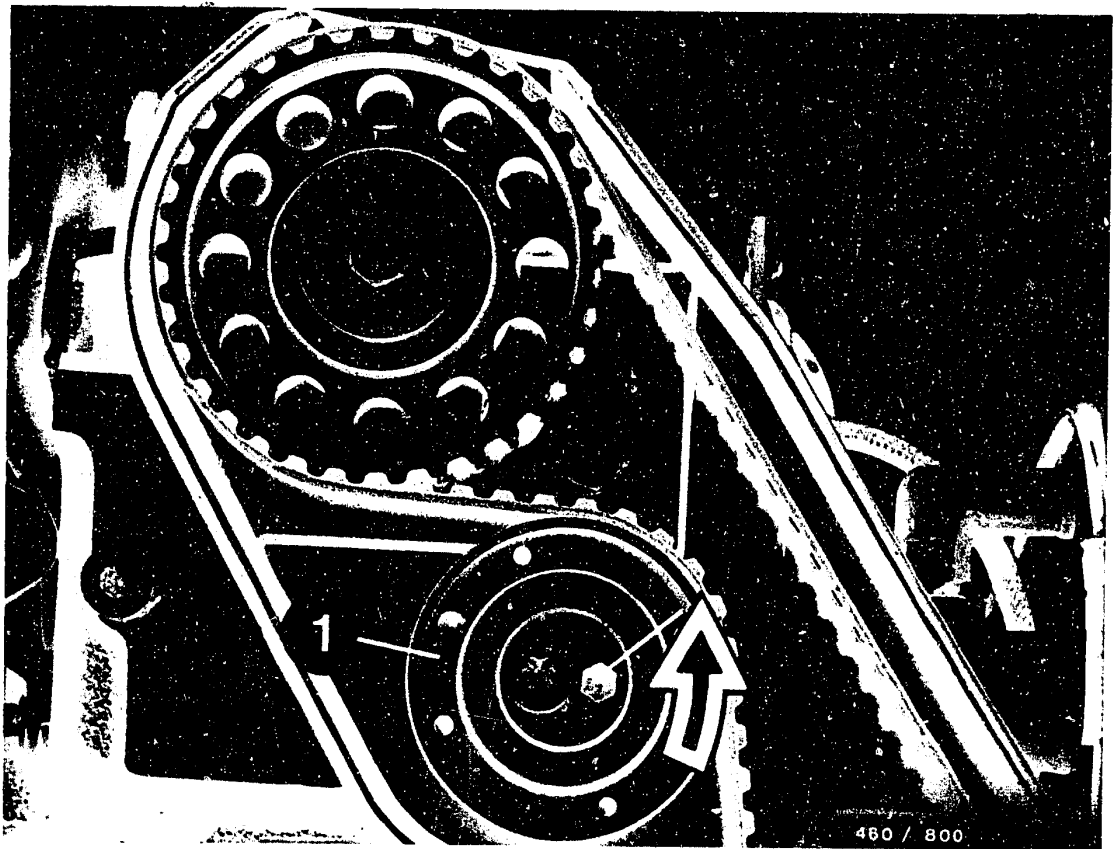
Set dimension: Scale value 12 - 13 Nm.

**F4**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D





If the measured value deviates from the set value, tension toothed belt to set value by pivoting the tensioning roller (1).

Tighten camshaft gear fastening screw to 27 - 33 Nm.

Remove setting rule KDEP 1117 and setting mandrel KDEP 1149.

Turn crankshaft over twice and check tension of toothed belt again.

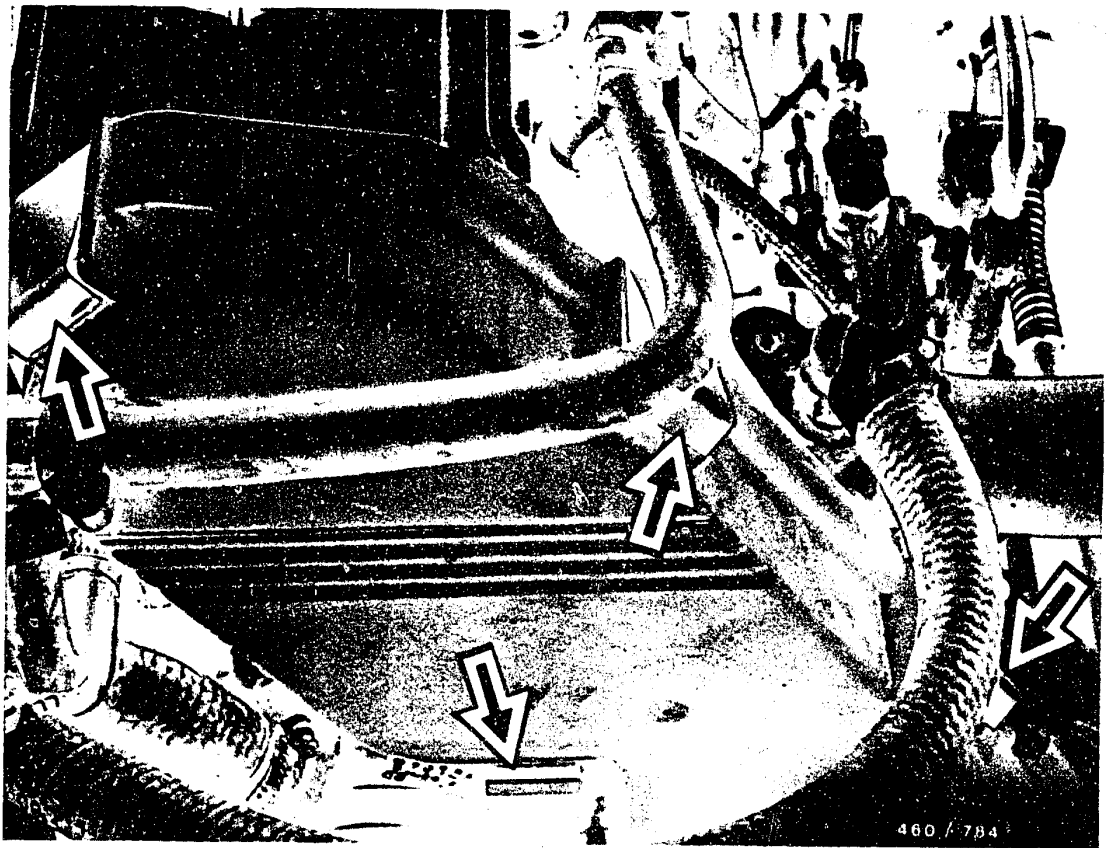
Mount toothed belt cover.  
Connect negative cable to battery.

**F5**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D





## 27. Test and adjust engine timing

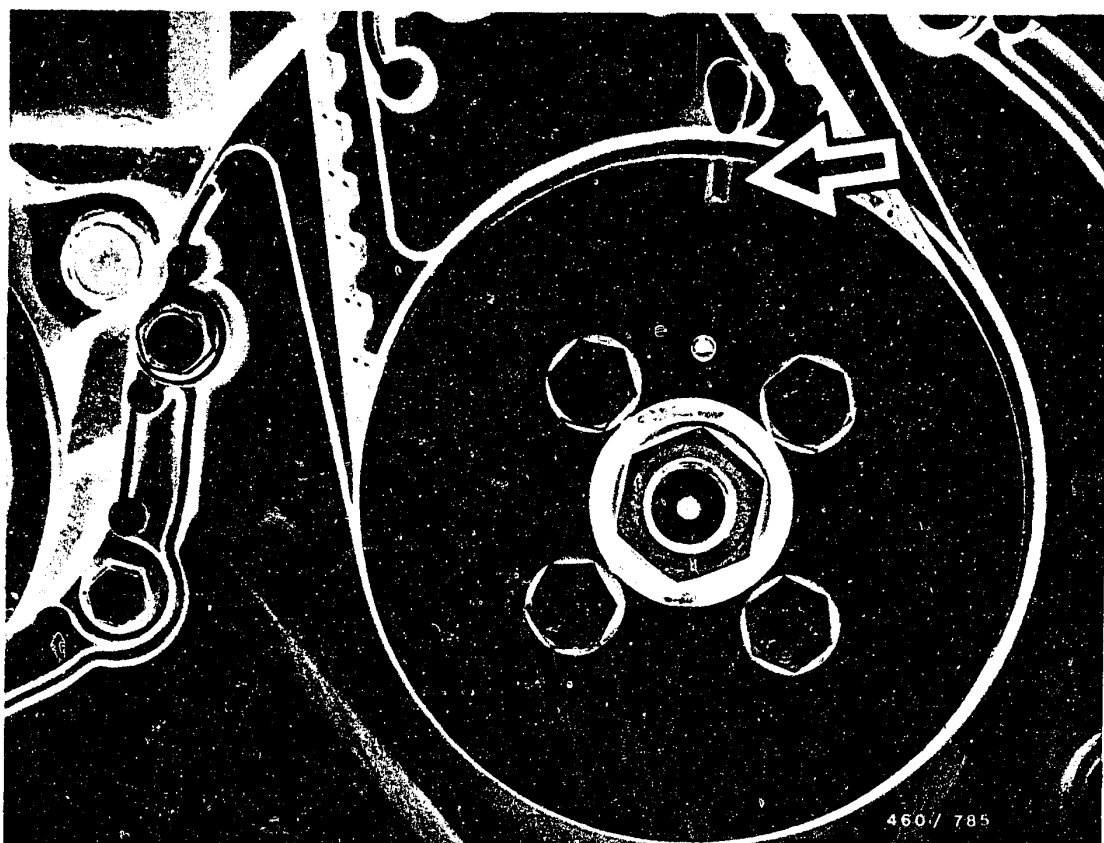
### 27.1 Test engine timing

Disconnect negative cable from battery.

Loosen spring clips (arrows).

Remove toothed-belt cover and cylinder-head cover.



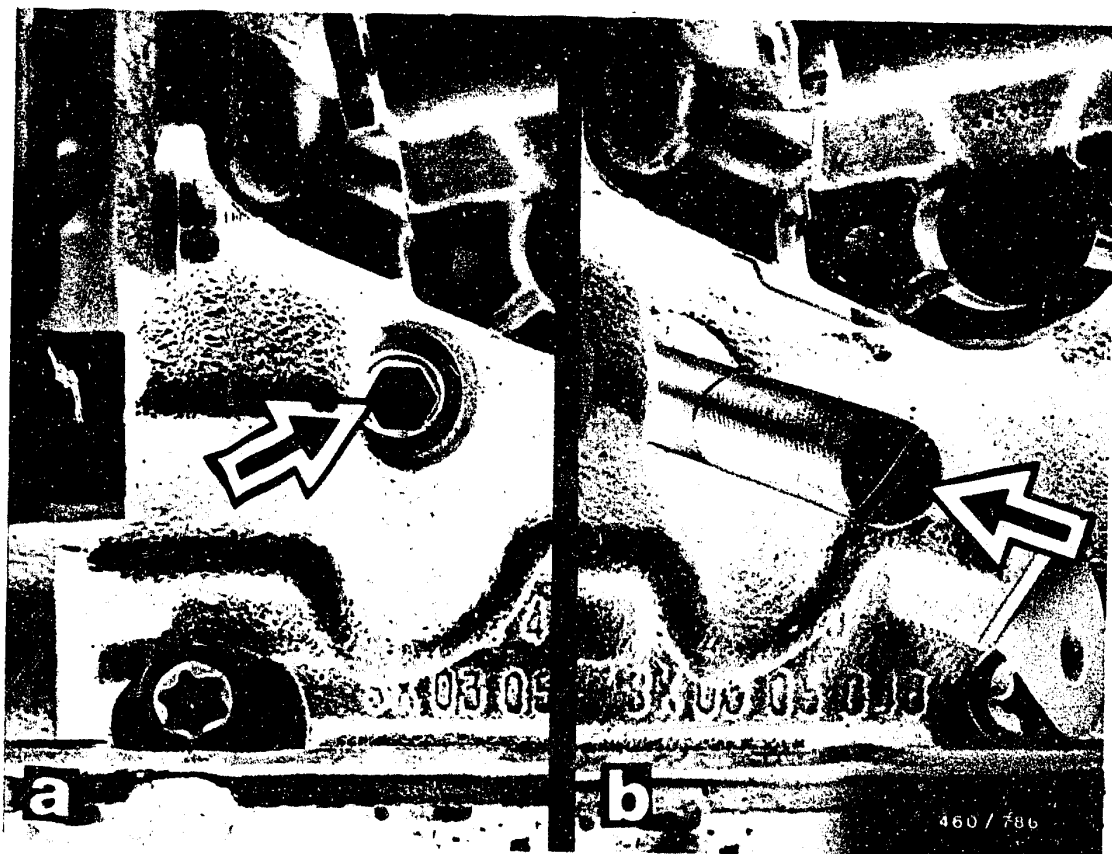


Turn crankshaft in engine direction of rotation until TDC mark (cylinder 1) on toothed-belt pulley of injection pump aligns with mark on end cover (arrow).

**F7**

Test and adjust engine timing  
Ford Escort D, Fiesta D, Orion D





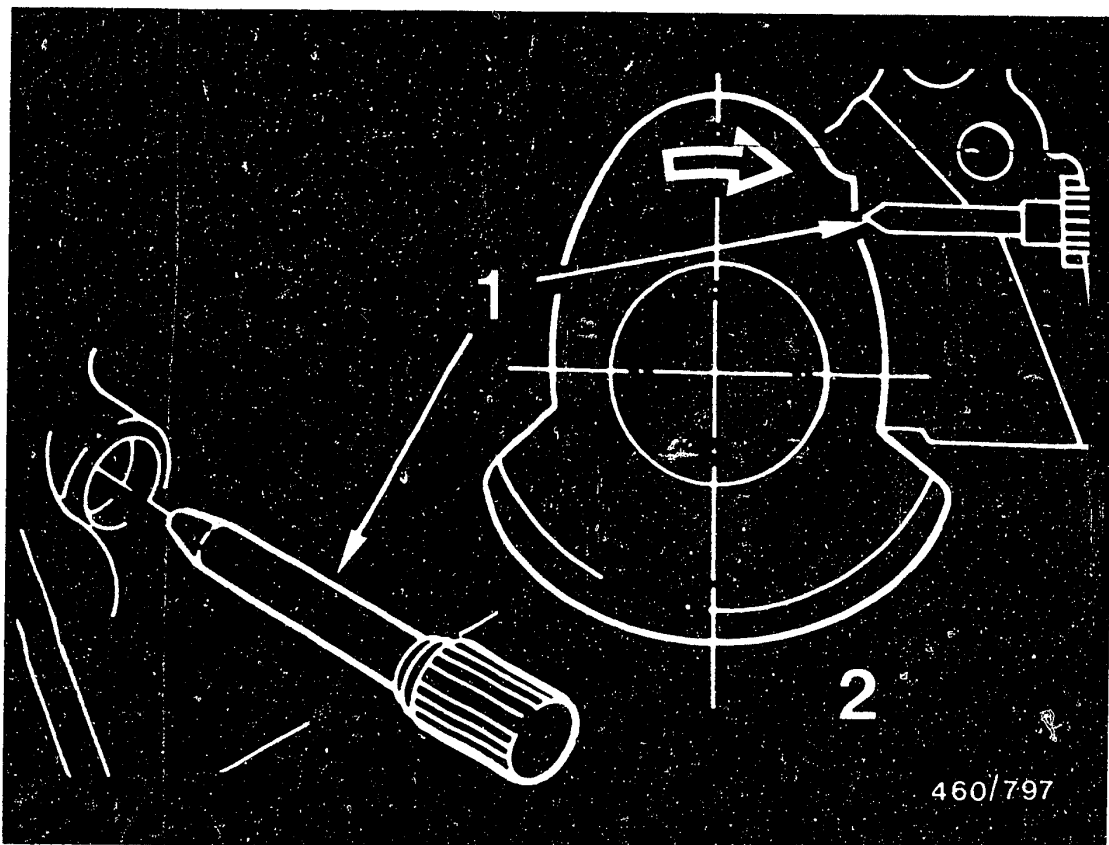
Remove screw plug (arrow, Fig. a).

Note:

Screw plug is situated on recess of engine block, below the alternator bracket.

Screw in setting mandrel (arrow, Fig. b).





- 1 = Setting mandrel KDEP 1149
- 2 = Crankshaft web

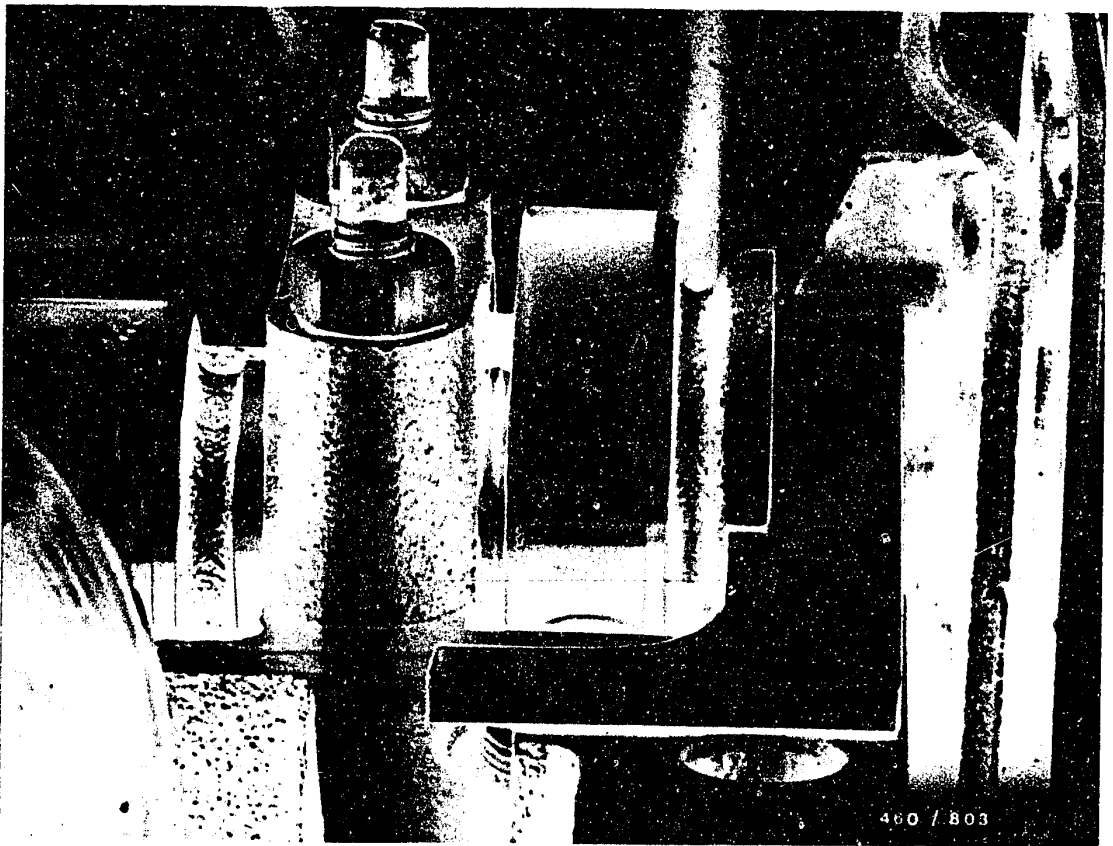
Slowly turn crankshaft in engine direction of rotation until crankshaft web is up against setting mandrel.

**F9**

Replace toothed belt

Ford Escort D, Fiesta D, Orion D





Slide setting rule KDEP 1117 into camshaft recess.

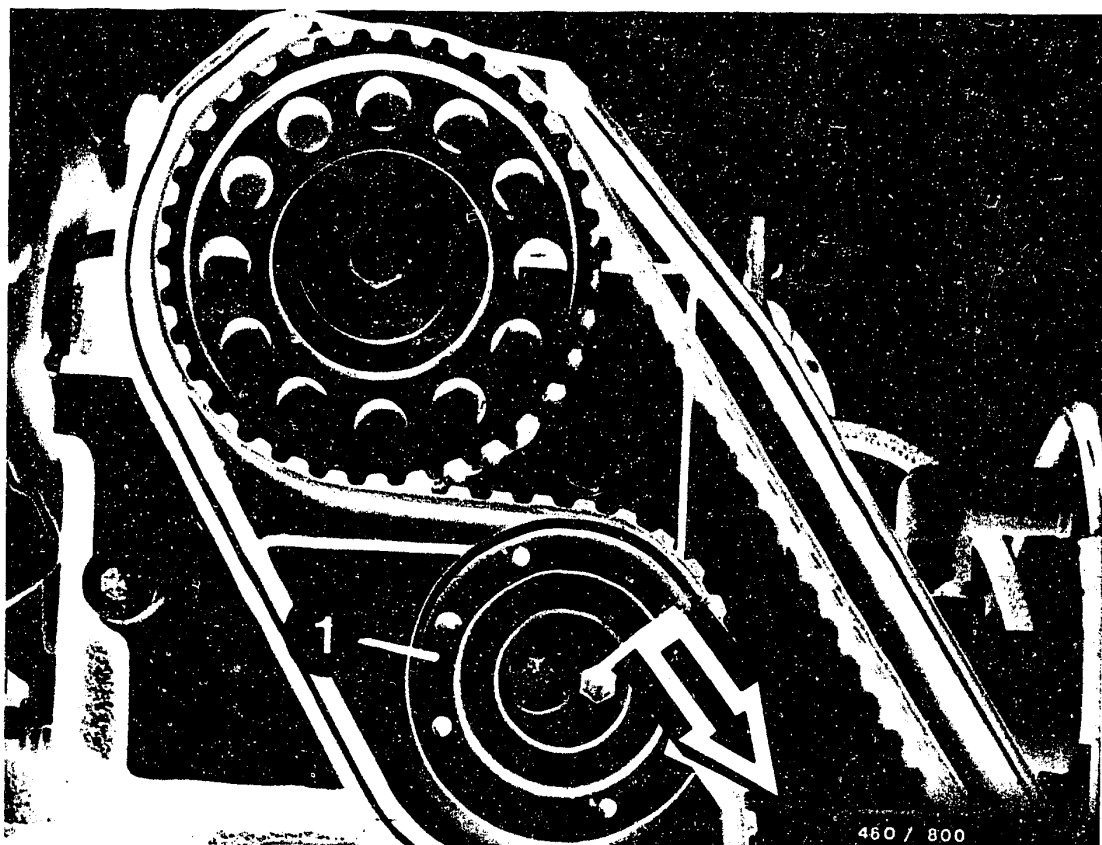
If setting rule cannot be introduced, correct engine timing.

**F10**

Test and adjust engine timing  
Ford Escort D, Fiesta D, Orion D







Loosen fastening screw on toothed-belt tensioning roller (1).

Force toothed-belt tensioning roller in a clockwise direction using commercially available hexagon-socket-screw key (arrow).

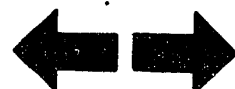
Remove toothed belt from camshaft gear and injection-pump toothed-belt pulley.

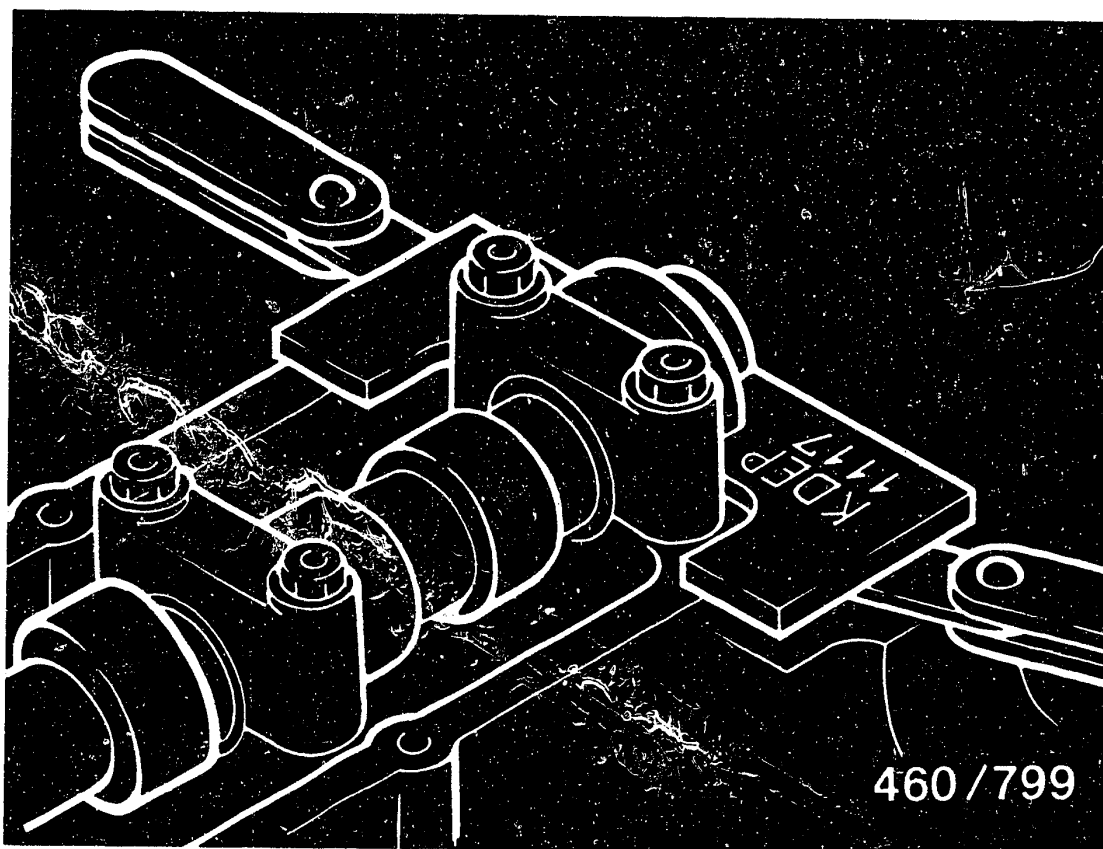
Note:

After removing the toothed belt, do not turn the crankshaft so as to prevent damage to pistons and valve gear.

**F11**

Test and adjust engine timing  
Ford Escort D, Fiesta D, Orion D



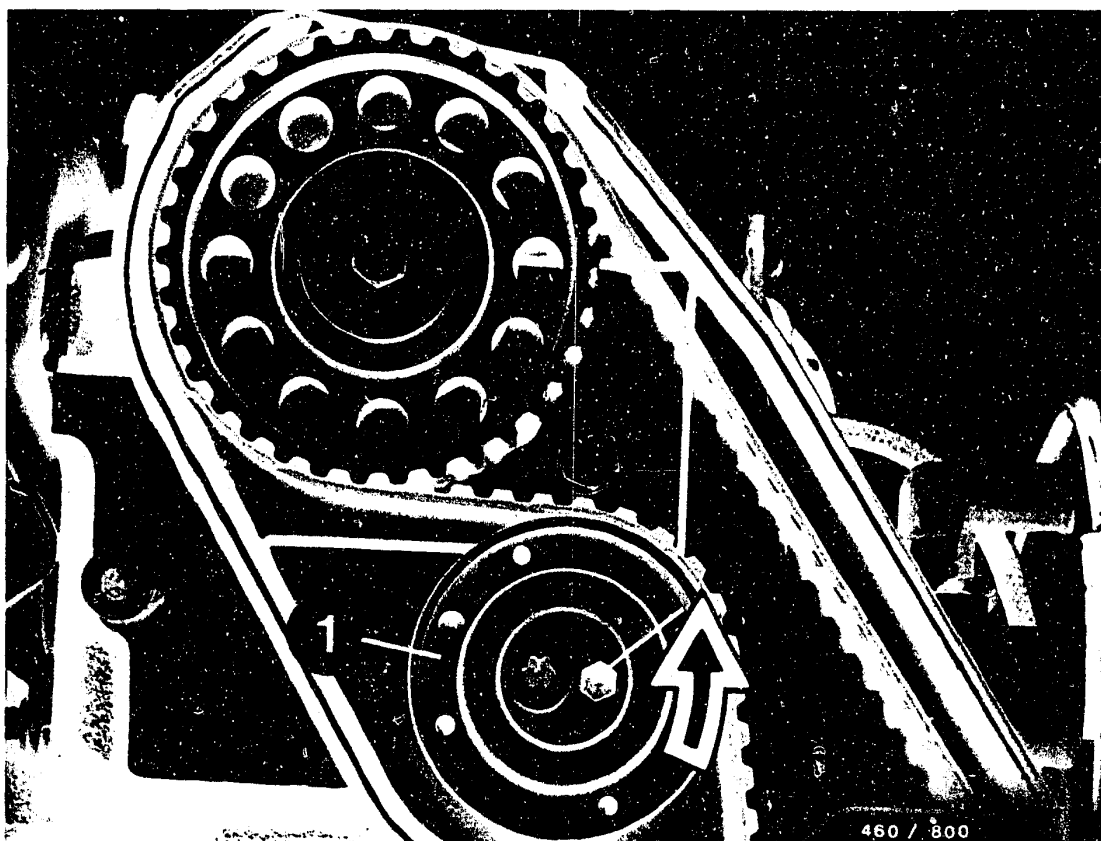


Turn camshaft gear until setting rule KDEP 1117 can be slid into groove at rear end of camshaft.

Center the setting rule as follows:

Slide two feeler gauges of equal thickness under each end of the setting rule (see picture) so that the groove in the camshaft aligns exactly with the surface of the cylinder head.





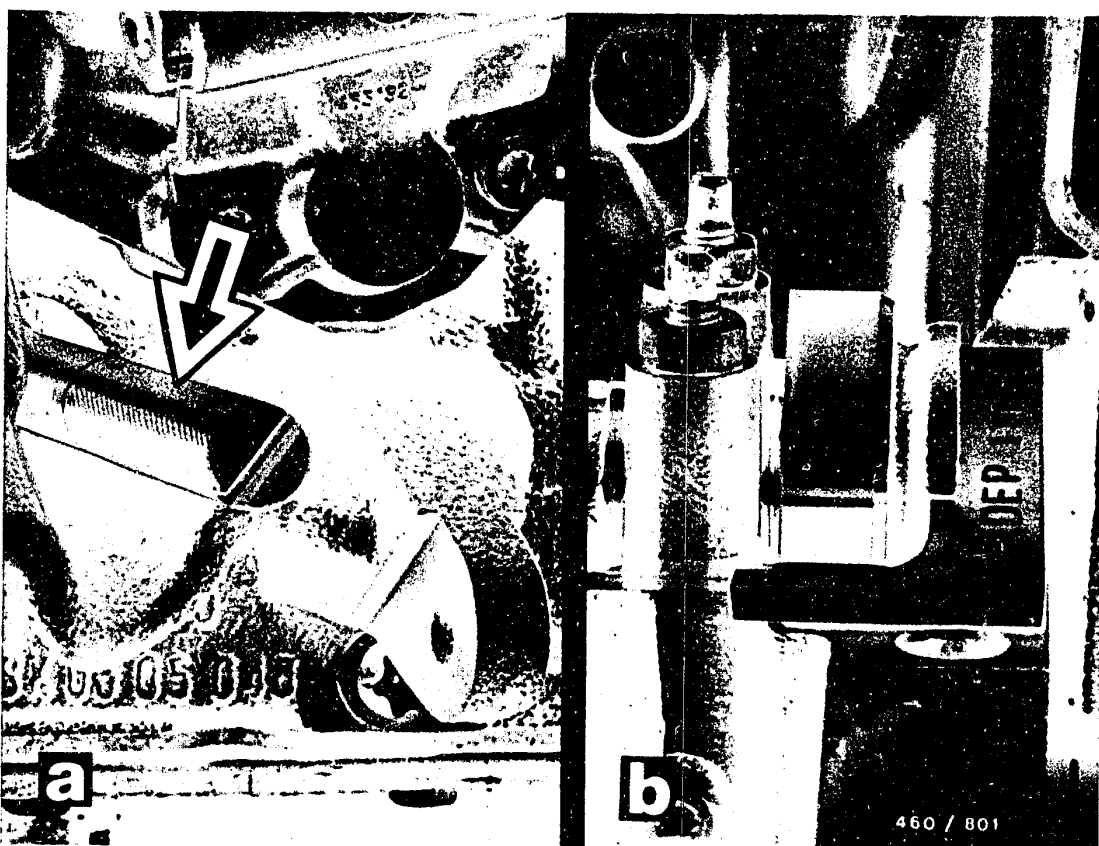
Loosen camshaft gear fastening screw (top).

Using a plastic hammer, carefully loosen camshaft gear from its tapered seat.

**F13**

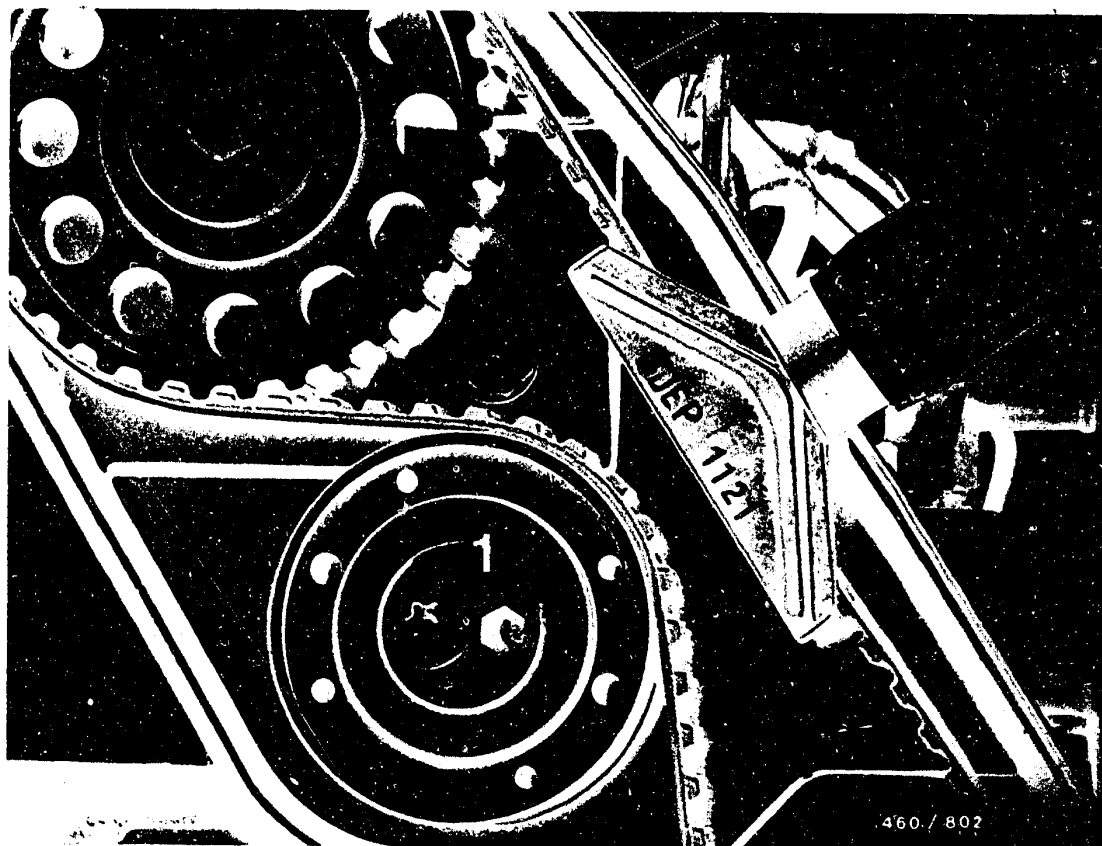
Test and adjust engine timing  
Ford Escort D, Fiesta D, Orion D





Before mounting the toothed belt, check whether the crankshaft is up against the setting mandrel (Fig. a) and whether the camshaft is located by means of setting rule KDEP 1117 with feeler gauges (Fig. b).





Put on toothed belt.

Turn tensioning roller (1) in a counterclockwise direction with hexagon-socket-screw key and tension toothed belt.

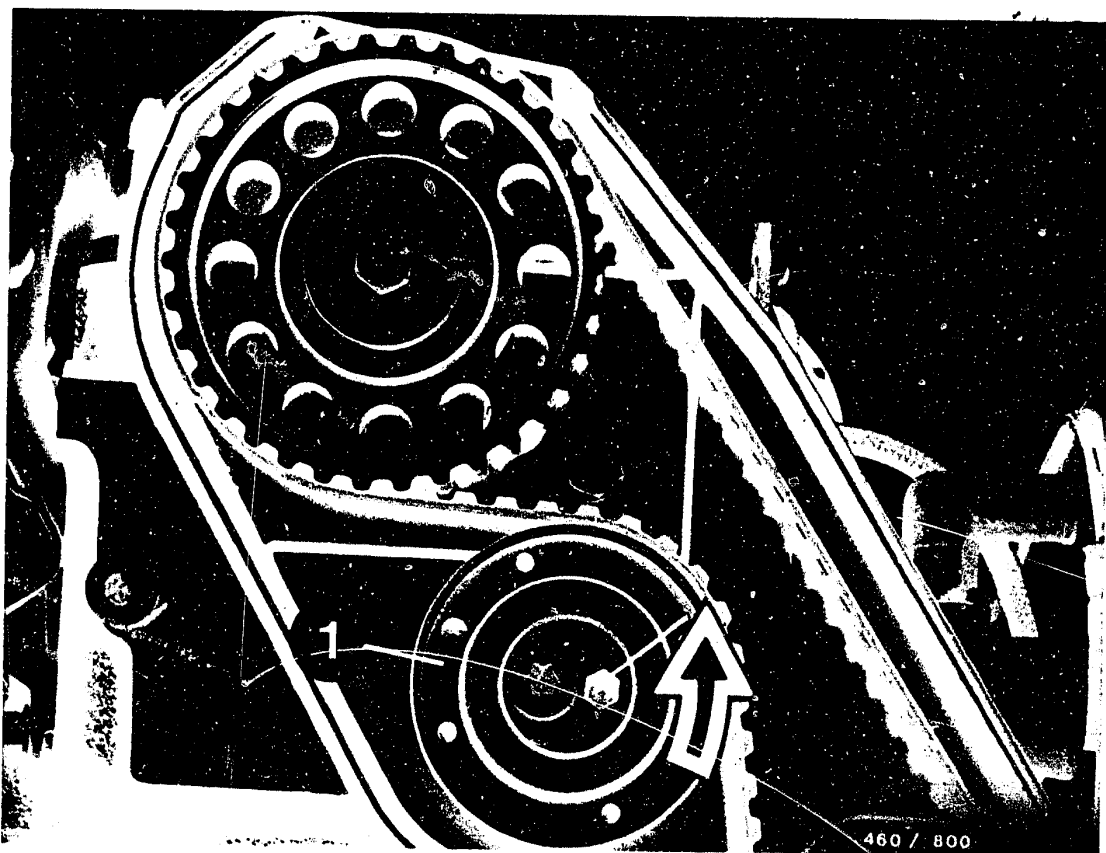
Test tension of toothed belt with belt tension tester KDEP 1121:

Mount belt tension tester as shown in picture.

Turn vernier sleeve until bottom edge of sleeve aligns with line mark on measuring tongue.

Set dimension: Scale value 12 - 13 Nm.





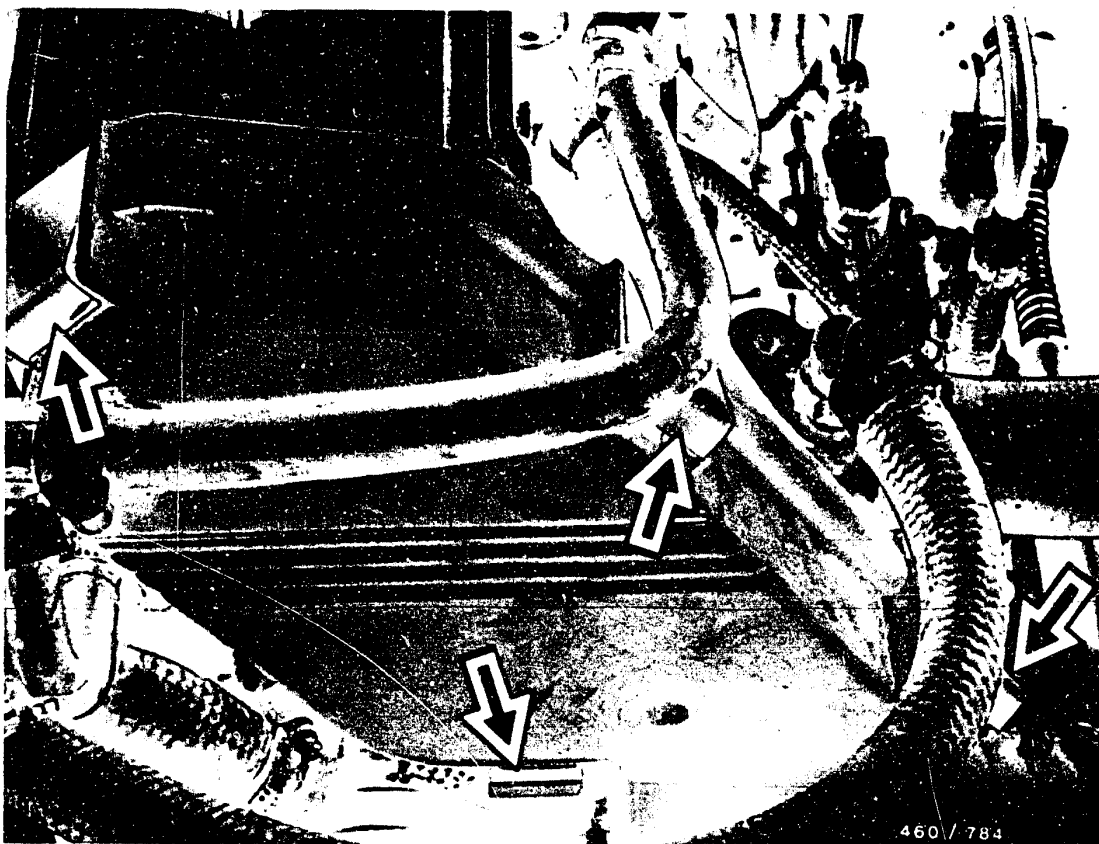
If the measured value deviates from the set value, tension toothed belt to set value by pivoting the tensioning roller (1).

Tighten camshaft gear fastening screw to 27 - 33 Nm.

Remove setting rule KDEP 1117 and setting mandrel KDEP 1149.

Turn crankshaft over twice and check tension of toothed belt again.

Mount toothed belt cover.  
Connect negative cable to battery.



### 28. Injection timing

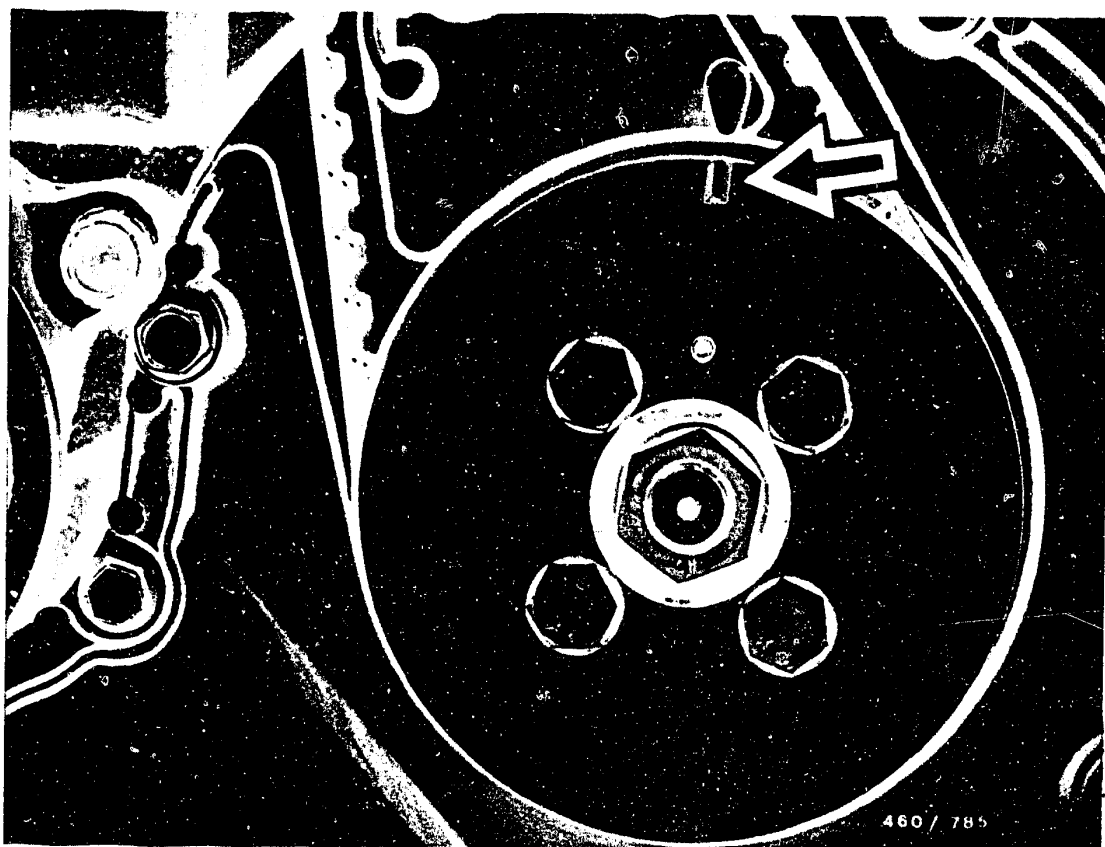
Disconnect negative cable from battery.  
Loosen spring clips (arrows) and remove toothed-belt cover.

**F17**

Injection timing

Ford Escort D, Fiesta D, Orion D





Turn crankshaft in engine direction of rotation until TDC mark (cylinder 1) on toothed-belt pulley of injection pump aligns with mark on end cover (arrow).

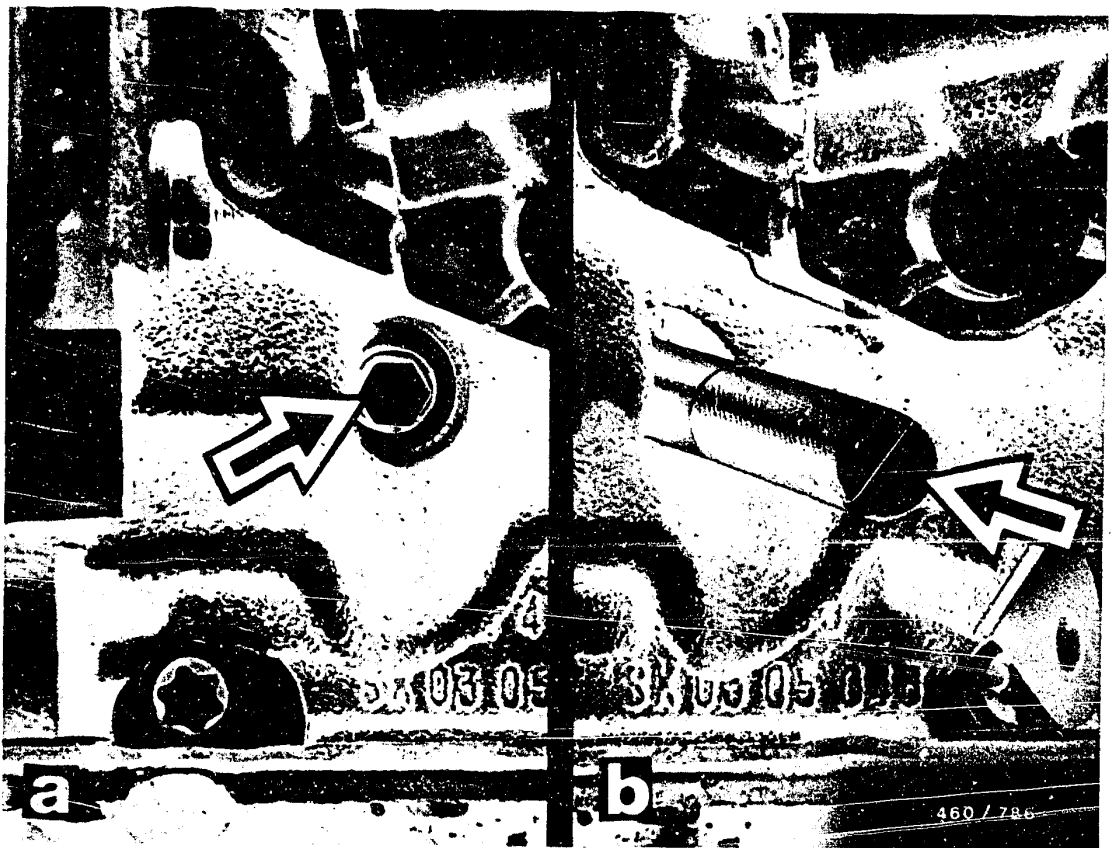
**F18**

Injection timing

Ford Escort D, Fiesta D, Orion D







Remove screw plug (arrow, Fig. a).

Note:

Screw plug is situated on recess of engine block, below the alternator bracket.

Screw in setting mandrel (arrow, Fig. b).

Slowly turn crankshaft in engine direction of rotation until crankshaft web is up against setting mandrel.





Unscrew bleeder screw from central screw plug (triangular plug) of hydraulic head.

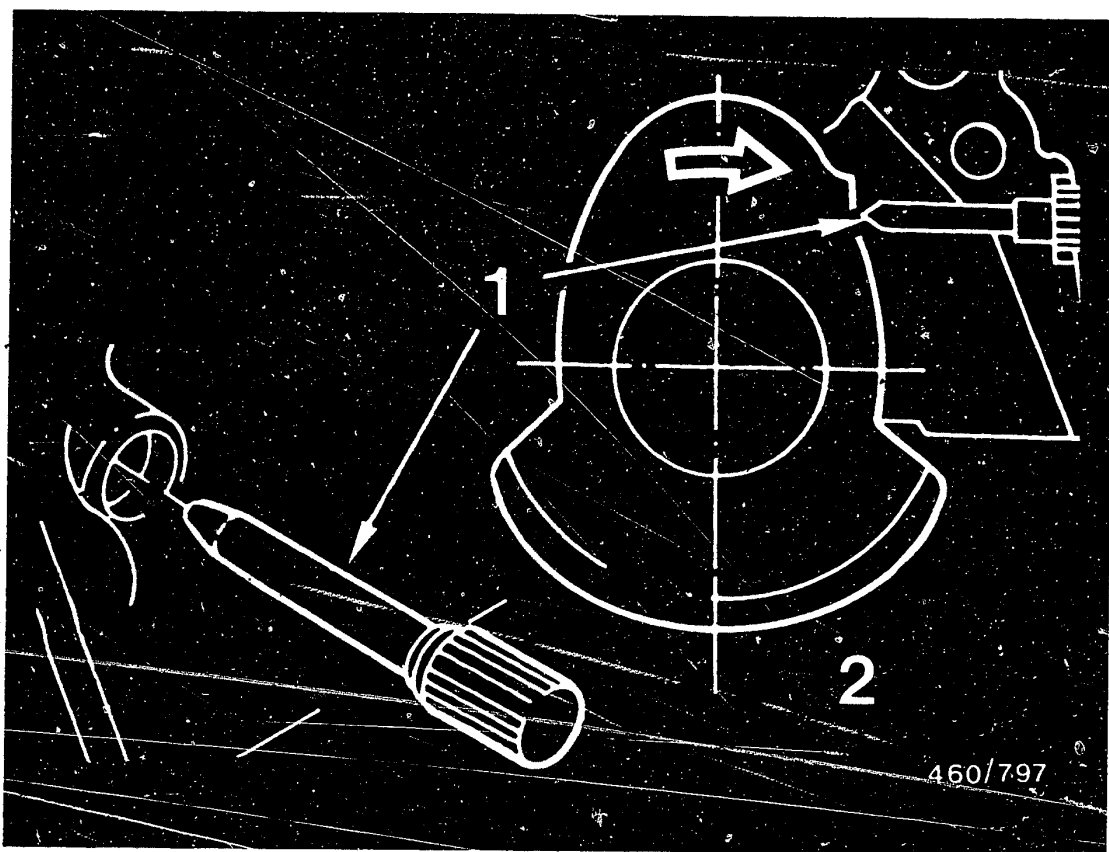
Mount measuring tool KDEP 1085 with dial indicator in tapped hole.

Preload dial indicator by approx. 2.5 mm.

Slowly turn crankshaft against engine direction of rotation until pointer of dial indicator no longer moves.

Preload dial indicator by approx. 1.0 mm and set to "0".

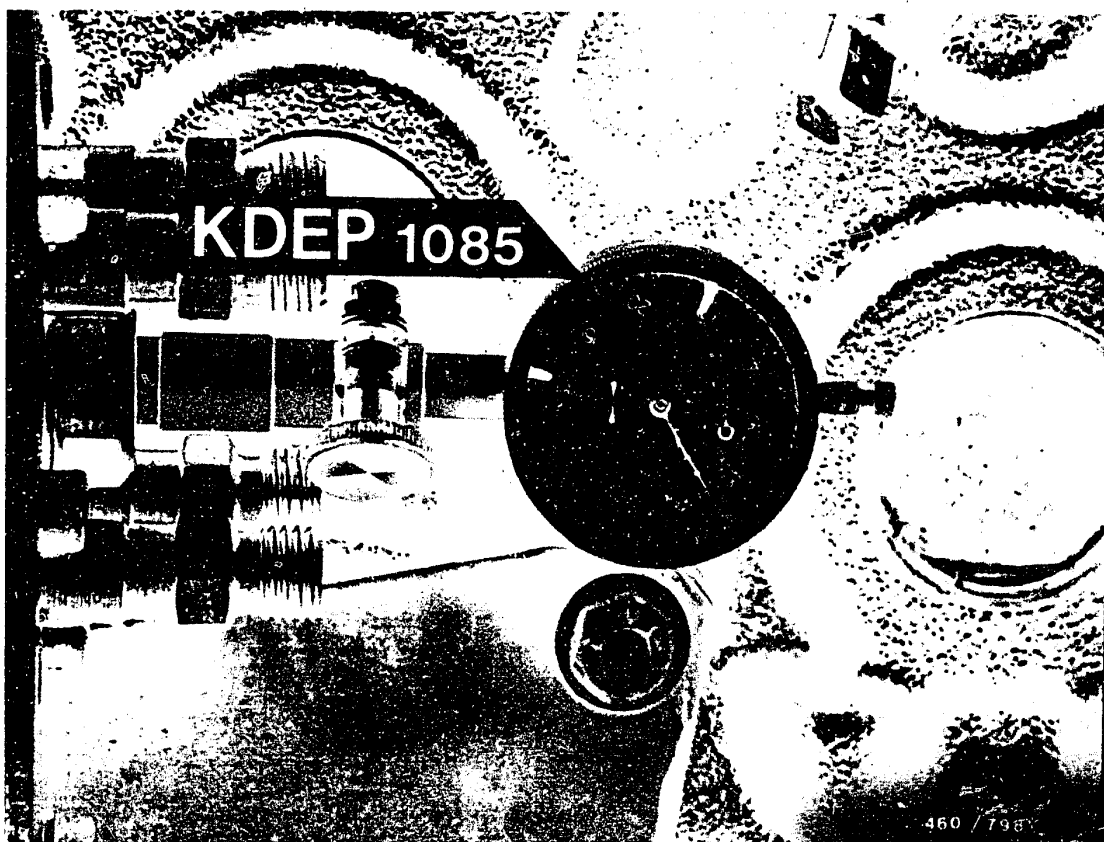




- 1 = Setting mandrel KDEP 1149  
2 = Crankshaft web

Slowly turn crankshaft in engine direction of rotation until crankshaft web is up against setting mandrel.

In this position, the dial indicator on the injection pump must indicate a plunger stroke of 0.91 - 0.93 mm ABDC.



If a correction is necessary, loosen injection-pump fastening screws.

Pivot injection pump until a stroke of 0.92 mm ABDC is reached.

Tighten injection-pump fastening screws to 15 - 25 Nm.  
Turn crankshaft over twice and check setting once again.



Remove measuring tool KDEP 1085 with dial indicator and holder.

Mount bleeder screw on injection pump with new seal ring.

Tighten injection lines with open box wrench KDEP 1115, making sure that the delivery-valve holders do not turn by holding with a wrench.

Mount toothed-belt cover.

Connect negative cable to battery.



# After-sales Service

## Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

UNEVEN IDLE (ENGINE MISFIRE)

VDT-I-Gen. 046 En

2.1982

Distributor-type fuel-injection pump VE..F..

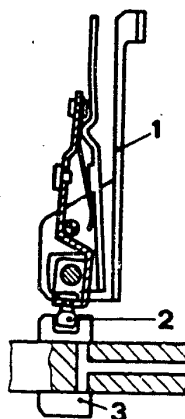
Complaints are occasionally being received concerning a variety of different vehicles (e.g. Fiat Ritmo). The complaints are about uneven idle or engine misfire.

The cause of the changes in engine speed during normal operation (i.e. engine misfire) can be a loose ball pin in the fulcrum lever.

In order to repair, the fulcrum lever must be removed and the ball pin (2) checked to ensure that it is seating firmly.

### Instructions for checking the ball pin:

Remove the fulcrum lever (1) and check the ball pin (2) for firm seating. If the ball pin is loose, fit a new fulcrum lever and ball pin.



- 1 = Fulcrum lever (Pos'n. 95)
- 2 = Ball pin
- 3 = Control collar

**BOSCH**

Geschäftsbereich KM Kundendienst Kfz-Ausrüstung  
© by Robert Bosch GmbH, D-7 Stuttgart 1, Postfach 50 Printed in the Federal Republic of Germany  
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH.

**N1**

Motor Vehicle Service Information

Ford Escort D, Fiesta D, Orion D



# After-sales Service

## Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

Fuel-injection equipment

DISTRIBUTOR FUEL-INJECTION PUMP VE.. F..

VDT-I-Gen. 062 En

2.1984

Complaints regarding idle shake  
and/or black smoke

Supersedes Ed. 12.1983

With individual vehicles fitted with VE-distributor pumps, complaints may arise concerning "idle shake" and/or "black smoke".

### 1. Idle shake and black smoke

If such complaints are received, first of all the delivery valves are to be checked, and damaged or broken valves replaced

The following pointers are given as an aid to trouble-shooting:

If the delivery valve is broken it delivers too much fuel from the outlet in question. The magnitude of this excessive quantity can only be determined on the test bench.

If the injection lines are disconnected one after another from the nozzle holders, the outlet with the broken delivery valve can be localised. This is because the disconnection of the outlet which is delivering too much fuel results in a far more pronounced speed drop than is the case with the intact delivery valves.

The delivery valves can be replaced in the vehicle if it is possible to tighten them with the specified torque of  $40 \text{ Nm} \pm 2 \text{ Nm}$  (see also VDT-I-460/132, 2.1984).

If the idle shake has been cured by these measures, but not the black smoke at full load, then the measures detailed in the following paragraph are to be carried out.

### 2. Black smoke

If complaints are received about black smoke, this can be caused by the delivery quantity having increased by  $2...3 \text{ cm}^3/1000 \text{ strokes}$ .

It is not necessary to remove the pump in order to cure this fault. It suffices if the full-load adjusting screw is screwed out by about 0.2 mm (approx. 1/4 turn). The screw is then to be sealed again with locking paint/varnish.

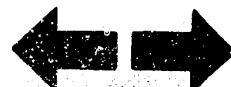
**BOSCH**

Geschäftsbereich KM Kundendienst Kfz-Ausrüstung  
© by Robert Bosch GmbH D-7 Stuttgart 1, Postfach 50. Printed in the Federal Republic of Germany  
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

**N2**

Motor Vehicle Service Information

Ford Escort D, Fiesta D, Orion D



The work detailed above is to be carried out free of charge within the warranty period, and warranty-processing will be in the normal manner.

Please direct questions and comments concerning the contents to our authorized representative in your country.

**N3**

Motor Vehicle Service Information  
Ford Escort D, Fiesta D, Orion D





## Table of contents

<u>Section</u>	<u>Coordinates</u>
Structure of microfiche	
1. Test specifications.....	A 2
2. Diagram of fuel lines.....	A 5
3. Circuit diagram of preheating system..	A 7
4. Test equipment and tools.....	A 9
5. Installation position of components...	A 11
6. Trouble-shooting chart.....	B 1
Test steps	
7. Check tank vent.....	B 5
8. Test operation of cold-start accelerator.....	B 6
9. Check routing of fuel-injection tubing.....	B 7
10. Test overflow restriction.....	B 8
11. Test shutoff device.....	B 9
12. Connection diagram of fuel lines.....	B 12
13. Bleed fuel system.....	B 14
14. Replace and drain water from filter box.....	B 17
15. Test injection system for leaks.....	B 20
16. Test fuel lines.....	B 23
17. Smoke test/check air filter.....	B 24
18. Adjust idle speed.....	C 8
19. Test injection nozzles.....	C 11
20. Test fuel filter.....	C 15
21. Test preheating system.....	C 18
22. Test timing device.....	D 10
23. Measure engine compression and compression loss.....	D 11
24. Remove fuel-injection pump.....	D 21



## Table of contents (continued)

<u>Section*</u>	<u>Coordinates</u>
25. Install fuel-injection pump.....	E 4
26. Replace toothed belt.....	E 21
27. Test and adjust engine timing.....	F 6
28. Injection timing.....	F 17
Motor Vehicle Service Information Sheets	N 1

© 1984 Robert Bosch GmbH

Automotive Equipment - After-Sales Service  
Department for Technical Publications KH/VDT,  
Postfach 50, D-7000 Stuttgart 1

Published by: After-Sales Service Department for  
Training and Technology (KH/VSK). Press date: 3.1984  
Please direct questions and comments concerning the  
contents to our authorized representative in your  
country.

This publication is only for the use of the Bosch  
After-Sales Service Organization, and may not be  
passed on to third parties without our consent.

Microfilmed in the Federal Republic of Germany. Micro-  
photographié en République Fédérale d'Allemagne.

